General definition of POI and tariff data structures

## *Publication of the S.A.F.E. Roaming Working Group*

This document is part of a series of distributions by the SAFE working group "Roaming". The individual issues of the series cover dedicated topics on the application of the calibration law in EV roaming networks. To understand this document please refer to the other issues available through safe-ev.de.

This document is written for all parties developing roaming solutions in electric mobility.

This document is a best practice document for the extension of the relevant roaming protocols regarding the context of calibration law. Ideally all roaming providers should adapt the suggested data structures and rules to allow for interoperability on the market.

## 1. Document Metadata

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Authors:     Sergi Tcaciuc (Wirelane), Andreas Weber (Allego), Michael Roeder (Chargepoint), Antonia Nickel (DCS), Markus Meingassner (VIRTA), Björn Osterkamp (Stromnetz Hamburg), Rahmen, Thomas (smartlab), Dickehage, Moritz (smartlab), Julia Drazic (Chargecloud), Dr. Patrick Ester (EON), Simon Schilling (SMATRICS)

## 2.    General definition of POI and tariff data structures

The Mobility Service Provider (MSP) is the party offering a charging tariff to end-customers. The MSP can freely define its own tariff fitting the company's business model. Not all charging stations might be compatible with a specific tariff from a calibration law perspective. In these cases dedicated tarif components might get applied for non-compatible stations. Therefore the MSP needs to receive all relevant information about the charging stations capabilities in order to filter the charging stations offered to the customer or select the tariff accordingly.

The Charge Point Operator (CPO) is responsible to provide the up-to-date POI data to the MSP. The delivered information is the legally binding data for the MSP. It is the MSPs responsibility to display the relevant data and apply a legally allowed tariff. Therefore the MSP relies on the data provided by the CPO.

Before a charging session can be started, the MSP needs to have the calibration law relevant information about the charging point. The required additional information besides other information is:

- Which transparency solution is in place?

- Which measurants will be delivered in the CDR by the CPO? (e.g. energy, time, power, …)

- Which samples will the charging station produce during the charging session? (e.g. start, end, intermediate, …)

- Can the sampling be influenced by the MSP via the session? (e.g. request additional samples, …)

- Is the charging station capable of bi-directional charging?

From this information the MSP has to decide if the customer's tariff can be offered at the charge point in question. If the charging station does not support all required features to invoice the customer's tariff, the MSP might switch to a fall-back tariff.

## 3.    Flexible tariffs

Why do we need to transmit flexible and dynamic tariff information?

The B2B prices the CPOs offer in the roaming relations are inhomogeneous. They do not only differ in price but also in pricing structures and tariff components. The MSPs however often offer a homogeneous price to their customers. For the tariff definition of these roaming tariffs the MSPs need to take all the included CPO offers into account.

For the EV Driver, the price of the charge will play an increasingly important role. Currently, some customers already compare gas pricing to the cent per liter. The price difference between two charges at two charge points will likely be more than the difference between two fuel stations. This makes reliable price information for the EV Driver vital.

In contrast to the traditional fueling process, it is expected that EV drivers will be seeing different tariffs based on when they charge their car. Due to the combination of parking and charging in non-fastcharging use cases, the price for the charging session can vary based both on the availability of electrical energy and parking space, further compounding the importance of pricing data availability.

The CPOs business case requires steering of utilization of the chargers. Especially high-demanded charging locations need to be freed-up for new users. CPOs add blocking fees to their B2B charging tariffs. Also some CPOs already offer dynamic prices to intencivate the utilization of their chargers.

For the future the capability to offer dynamic tariffs could become a necessity to fund the investments into charging infrastructure.

The MSP needs to take the customers needs and the CPOs offers into account when defining tariffs. The demands of the two parties however are often contrary.

To conform to the consumer protection laws the MSPs are also required to inform the customer about the tariff and price-components of a charging session before the charging takes place. During a charging session the user needs to be able to see the current value of the session. After the charging session tariffing information has to be supplied with the invoice. The customer also needs to be able to compare different charging options before deciding for one.

As of today the roaming platforms only transmit B2B prices from the CPO to the MSP. Some MSPs might forward the B2B price to the customer, others will define an independent tariff but need to cover the cost or have a mixed calculation. To conform to the requirements of the calibration law the MSPs do not only have to take the cost into account but also need to receive the relevant data for each charging session.

When the adherence to the calibration law is not included, the usually transmitted data is sufficient for the MSP to form nearly any kind of tariff. With the calibration law in place, the billing relies on signed data produced by an inhomogeneous fleet of charging stations.

Additionally MSP tariffs will evolve over time, therefore systems should remain flexible to allow market consolidation.

## 1.      Calibration law conforming B2C Tariffs

The MSP wants to define flexible and/or dynamic tariffs for their customers. E.g. the MSP might want to offer a tariff with cheaper rates during the night or follow the energy market price. The capability to apply a tariff at a chargepoint depends on the hardware and the capabilities of the CPO. To offer a certain tariff to the customer the MSP needs to receive the information about these capabilities up-front and binding. For example the MSP might need to receive a metering value at the time of a tariff change. Therefore the CPO has to declare which data points will be delivered in the CDR after the session.

The CPO has no information about the B2C tariffs. The MSP must know which meter readings will be performed by the charging station to select the right tariff model.  Examples for metering points are:

- a energy register reading at a defined time (e.g. every 15 minutes or at 8 pm and 6 am)
- excess or underrun of a given power level (e.g. for a customer on a HPC with a EV which is only capable of 50-kW-DC charging power)
- after a given duration from the start of the session (e.g. every 10 minutes after session start)

## 2. Calibration law conforming B2B Tariffs

The CPO wants to offer flexible tariffs to the MSP to intensivate the utilization of various chargers to e.g. different times. For example the B2B tariff defines "free of charge" in off-peak hours. The MSP still needs to receive the available metering values to apply the individual tariff e.g. by energy.

After the charging session both tariffs (B2B and B2C) need to be applied based on the generated metering data. The MSP can only apply tariff components provided by the CPO but might not forward all components to the customer. Also the MSP might want to add additional tariff components which were not part of the B2B tariff.

## 3. Example tariffs

The following tariffs can/will be offered by the MSPs to the customers. The intencivation might come from the CPO through the B2B tariff (e.g. additional time component).

|  | B2C Tariff with a day and a night price (CPO independent) | B2C Tariff with a day and a night price (following CPO) |
|---|---|---|
| **Pricing** | energy-based | energy-based |
| **B2C tariff** | MSP offers tariff with a cheaper night-time price | MSP offers tariff with a cheaper night-time price |
| **B2B tariff** | B2B tariff is **not** differentiating | B2B tariff **is differentiating** at the same times as B2C tariff |
| **Requirements for the MSP** | Know up-front that the charging station will generate signed values.<br><br>The charging station must generate a signed metering value at the times the B2C tariff changes. | Know up-front that the charging station will generate signed values.<br><br>Know up-front at what time the charging station will switch to the night tariff.<br><br>The charging station must generate a signed metering value at the times the B2B or B2C tariff changes. |

## 4. Other required data

The charging stations version and capabilities is identified by the compliance identification data. The station might be able to support multiple metering data formats. Some stations allow the CPO to configure the produced data format. Therefore the MSP needs to receive the information about the current configuration.

The public key of the charging station is not a required information before a charging session is started. The key will be made available with the CDR data after the session.

## 5. POI Data content

To reflect the capabilities of a charge point, the CPO must communicate the relevant information to the MSP.

The calibration law compliant POI has to contain two additional fields:

- **Compliance identification**
  - Compliance ID: A unique ID referencing one individual solution. This can be used to link to the instructions for metering data processing. ("Nummer der Baumusterprüfbescheinigung")
  - Revision number (optional)
  - Validity date of the compliance document
- **Charge point billing/metering configuration**
  - Metering Data format and version
  - List of promised measurements to be transmitted with the CDR as legally relevant signed values
  - Details per promised measurant:
    - obis code
    - interval: e.g. 15min
    - synchronization: clock/session[1]
    - minimum start and end values need to be transmitted

## 6. Existing Solutions – POI Data

The existing roaming protocols already define data structures for calibration law relevant data.

### 1. OICP

With the release of OICP 2.3 in the beginning of October 2020 Hubject has added support for Eichrecht through roaming. The suggestion of Hubject for POI data exchange between CPO and EMP includes a new parameter:

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[1] The metering interval might be synchronized to the clock or to the start of the charging session

## 2.21. CalibrationLawDataAvailabilityType

| Option | Description |
|---|---|
| Local | Calibration law data is shown at the charging station. |
| External | Calibration law data is provided externaly |
| Not Available | Calibration law data is not provided. |

### 2. OCPI

The locations module of OCPI relevant for the POI-data does not yet define calibration law capabilities in OCPI2.1.1 and OCPI2.2d2.

### 3. OCHP

With the release of OCHP 1.4.1 in April 2020 e-clearing.net has added support for Eichrecht through roaming. The suggestion of e-clearing.net for POI data exchange between CPO and EMP includes a new parameter:

## MeteringInfoType *class*

This class defines the parameters, catering the Eichrecht law.

| Field Name | Field Type | Card. | Description |
|---|---|---|---|
| meteringType | string | 1 | Defines the method/solution to review charging data. Accepted values are: "local", "software", "other". |
| meteringVendor | string(32) | 1 | Contains the name of the vendor. |
| meteringVendorVersion | string(32) | 1 | Defines the solution version number. |
| meteringData | string(255) | * | Contains at least the starting and ending meter values of a certain charging session. |
| meteringKey | string(255) | * | Defines the public key of a charging pole as defined in the Eichrecht law. |

### 7. Summary

In EV roaming, the charge point has always been a virtual entity in the abstraction layer above the physical hardware. MSPs did not need to receive any hardware details to offer their services to the customers. With the implementation of calibration law conformity on the CPO and MSP side, the inhomogeneous capabilities of the hardware, this abstraction is a hurdle for the MSPs.

If the MSP wants to offer a flexible and/or dynamic tariff, not all charging stations will be able to produce the necessary metering data. To still offer the tariff, the MSP has the following options:

1. Filter charge points not conform to the tariffs requirements

2. Have a fallback tariff in place for not conform charging stations

3. Forward CPO tariff to the customer

4. Other individual options

This document discusses the necessary additional data points in the POI set. In the last chapter the status analysis of the roaming protocols shows that currently none of the reviewed protocols offers the discussed data fields.

## 8. Outlook

During the development of this document, the working group discovered the following gaps in the current practice and standardisation. These will be addressed in one of the following issues.

- A feedback channel from the MSP to the CPO to show the applied tariff information at the charging station display.

- Ability for the MSP to request or require the CPO to trigger additional metering points.

- Definition of change processes, e.g. the changes in the compliance configuration of a charging station or the  introduction of a new compliance method by a CPO.

- Additional requirements from the introduction of V2G and smart charging technology.