



OPEN
CHARGE
POINT
INTERFACE

OCPI 3.0-1

Business Use Cases

<https://github.com/ocpi> & <https://evroaming.org>

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EVRoaming Foundation



OCPI is developed and managed by the EVRoaming Foundation. The EVRoaming Foundation is a contributor based organisation. Everyone can join the EVRoaming Foundation via <https://www.evroaming.org>

The EVRoaming Foundation strives to keep OCPI as free from IPR as possible. If you want to contribute by adding new functionality/features, you are required to send us the signed Contributor Agreement (CA) document before contributing. To get the CA, ask for it by send an e-mail to: info@evroaming.org.

Version History

Version	Date	Author	Description
3.0-review2	2024-03-12	Michel Bayings <i>EVRoaming Foundation</i>	Updated introductory texts.
3.0-review1	2024-02-22	Reinier Lamers <i>ihomer</i>	<p>Added use case B3.6 for charging with IEC 15118.</p> <p>Added references to Functional Use Cases.</p> <p>Removed Business Use Cases related to transferring Contract Certificates.</p> <p>Added Business Use Case for invoice reconciliation.</p> <p>Added Business Use Case for knowing which EVSEs are in the same Charging Station.</p> <p>Added Business Use Case for showing Tariffs in human-readable form.</p> <p>Added Business Use Case for CPO announcing future Tariff changes.</p> <p>Added Business Use Case for eMSP checking Session fee computation.</p> <p>Added Business Use Case for having Tarif Associations separate from Tariffs.</p> <p>Added Business Use Cases for Power Regulation.</p> <p>Added Business Use Case for eMSP presenting Drivers with a Tariff timeline.</p>
3.0-1 Base v1.0	2021-10-01	Reinier Lamers <i>ihomer</i>	<p>Added use cases B1.4 and B1.5 for aggregators collecting location data.</p> <p>Added more introduction text for Business Use Cases.</p> <p>Updated caption for Reference Overview diagram in Business Use Cases</p>
3.0-1 Draft v0.7	2021-09-13	Robert de Leeuw <i>ihomer</i>	<p>Improved use cases B2.4 and 4.2: added definition of charging limit and note that the exact limits are still being discussed.</p> <p>Added definition of charging session.</p>
3.0-1 Draft v0.6	2021-07-02	Robert de Leeuw <i>ihomer</i>	Improved use case B5.2: added objective of accepting/rejecting CDR, improved description.
3.0-1 Draft v0.5	2021-06-30	Robert de Leeuw <i>ihomer</i>	<p>Added Loyalty use case: B9.1</p> <p>Added Token use cases: B3.3 and B3.4</p> <p>Added A-CPO, T-CPO, D-MSP and R-MSP</p>
3.0-1 Draft v0.4	2021-06-23	Robert de Leeuw <i>ihomer</i>	<p>Added improvements from the list of 3.0 improvements</p> <p>Create a new diagram for provisioning of certificates in 4.1</p> <p>Updated use case B3.3 to center it around the CCP</p> <p>Renamed this document to OCPI 3.0-1</p>
3.0 Draft v0.3	2021-06-10	Robert de Leeuw <i>ihomer</i>	Added ISO15118 certificate handling use cases

Version	Date	Author	Description
3.0 Draft v0.2	2021-05-28	Robert de Leeuw <i>ihomer</i>	Added signage use case, some minor improvements, add roles diagram
3.0 Draft v0.1	2021-05-26	Robert de Leeuw <i>ihomer</i>	First draft of the Business Use Cases for OCPI 3.0
3.0 Draft 0	2019-06-19	Robert de Leeuw <i>ihomer</i>	First documentation structure for OCPI 3.0, moved all existing documentation to the new documents

Document revisions There can be multiple documentation revisions of the same version of the OCPI protocol.

The newer documentation revisions of the same protocol version can never change the content of the messages: no new fields or renaming of fields. A new revision can only clarify/fix texts/descriptions and fix typos etc.

These documentation revisions (not the first) will be named: d2, d3, d4 etc.

Examples:

- OCPI 2.1.1 is a different protocol version of OCPI than OCPI 2.1.
- OCPI 2.0-d2 is the same protocol version as OCPI 2.0, but a newer documentation revision: same protocol, newer documentation.

1. Introduction

The Open Charge Point Interface (OCPI) enables a scalable, automated EV roaming setup between Charge Point Operators and e-Mobility Service Providers. It supports authorization, charge point information exchange (including live status updates and transaction events), charge detail record exchange, remote commands to Charging Stations and, finally, the exchange of smart-charging commands between parties.

It offers market participants in EV an attractive and scalable solution for (international) roaming between networks, avoiding the costs and innovation-limiting complexities involved with today's non-automated solutions or with central roaming hubs.

As such it helps to enable EV drivers to charge everywhere in a fully-informed way, helps the market to develop quickly and helps market players to execute their business models in the best way. The main design goals are:

- A good roaming system, leaving market parties the choice of using bilateral communication or a hub
- Real-time information about location, availability and price of charging facilities
- A uniform way of data exchange before during and after a charging transaction with Notification Data Records and Charge Data Records
- Support for access to any Charging Station using a mobile phone without pre-registration

Starting in 2009, the e-laad foundation and the predecessor of eViolin, the industry organization for EV operators and service providers in The Netherlands, specified two standards in order to retrieve Charging Station details and active state. These were called the *VAS interface* and the *Amsterdam interface*. In this same period, a CDR format for the exchange of charge sessions between eViolin members was defined. This format is currently in use by the majority of eViolin members. This resulted in the development of OCPI in 2014.

An international group of companies already supports OCPI. Initiators are EV Box, The New Motion, ElaadNL, BeCharged, Greenflux and Last Mile Solutions. Other participants include Next Charge, Freshmile, Plugsurfing, Charge-partner, Hubject, e-clearing.net, IHomer and Siemens. Several other major organizations and roaming platforms are interested in participating. The Netherlands Knowledge Platform for Charging Infrastructure (NKL) facilitates and coordinates this project to guarantee progress and ensure development and results. Part of this project is to find a place to continue development in the future.

This document contains the OCPI 3.0 business use cases. The name of this document is OCPI 3.0-1. This document describes, on high level, the functionality of OCPI 3.0. Based on these business use cases, functional use cases and specifications will be developed.

Editorial Note: As the work on OCPI 3.0 has not finished, this document may be updated during the further development of OCPI 3.0, based on new insights and input from the user community.

1.1. Contributors

The following parties participated in defining these business use cases:

- Emobility Consulting
- IBIL
- DCS
- Tandem Drive

- Fastned
- FLO
- Chargepoint
- Gireve
- EnBW
- Freshmile
- Last Mile Solutions
- Google Maps
- SemaConnect
- GreenFlux
- Optimile
- Monit Data
- IHomer

1.2. Terminology and Definitions

1.2.1. Abbreviations

Abbr.	Description
A-CPO	Administrative CPO
AGG	Data Aggregator
CCP	Contract Certificate Pool
CDR	Charge Detail Record
CPO	Charge Point Operator
CPS	Certificate Provisioning Service
D-MSP	Driver MSP, manages the EV Driver contracts, relations and billing etc.
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
MSP	e-Mobility Service Provider
NAP	National Access Point
NSP	Navigation Service Provider
OEM	Original Equipment Manufacturer. In OCPI context: Car Manufacturer.
PCP	(OEM) Provisioning Certificate Pool
POI	Point of Interest
OCPP	Open Charge Point Protocol

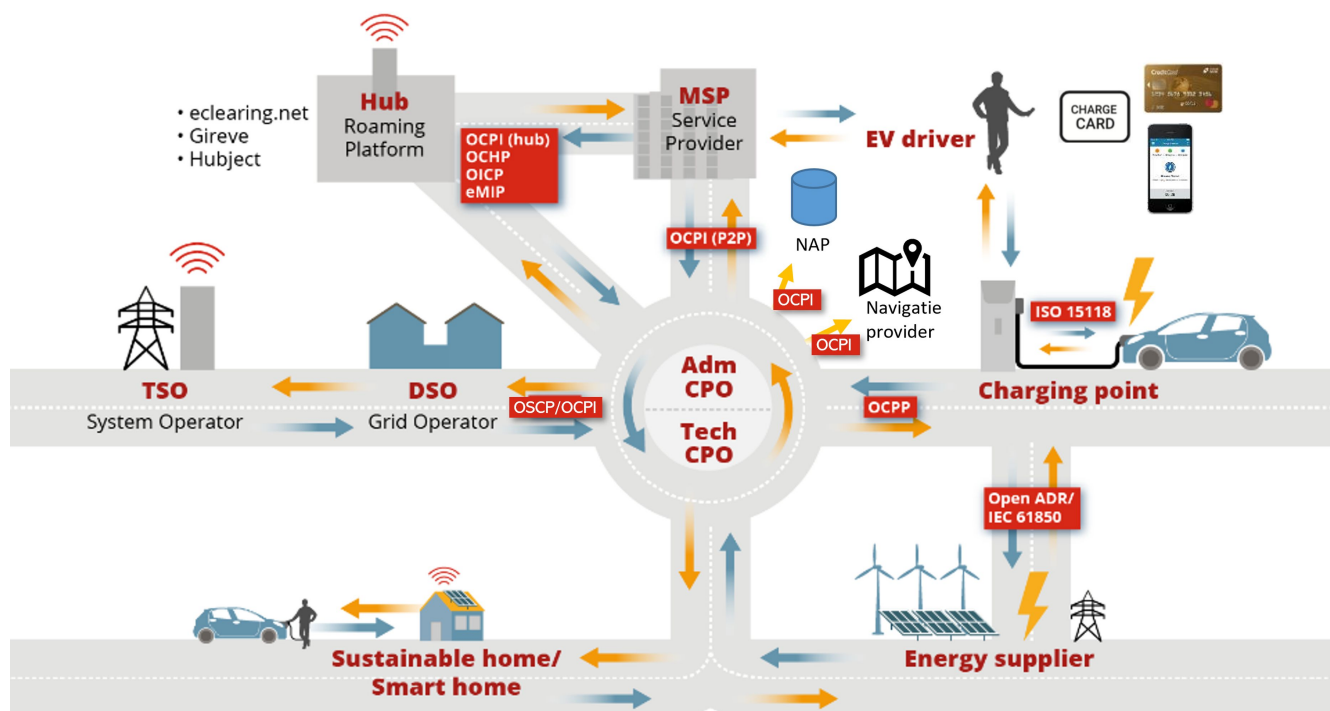
Abbr.	Description
R-MSP	Roaming MSP
SaaS	Software as a Service
SCSP	Smart Charging Service Provider
T-CPO	Technical CPO

1.2.2. EV Charging Market Roles

In the EV Charging landscape, different market roles can be identified.

Role	Description
A-CPO	Administrative CPO, part or the CPO role.
CCP	Contract Certificate Pool
CPO	Charge Point Operator. Operates a network of Charging Stations.
CPS	Certificate Provisioning Service. Service responsible for signing Contract Certificate Bundles.
Data Aggregator	A Company/Organization that compiles statistics etc from data from different sources and provides to 3th parties.
D-MSP	Driver MSP, part or the MSP role.
MSP	e-Mobility Service Provider. Gives EV drivers access to charging services.
Hub	Can connect one or more CPOs to one or more MSPs, or other OCPI roles.
Grid Operator	Company operating the electricity grid.
NAP	National Access Point.
NSP	Navigation Service Provider.
PCP	(OEM) Provisioning Certificate Pool.
R-MSP	Roaming MSP, part of the MSP role
Roaming Hub	See: Hub.
SCSP	Smart Charging Service Provider.
T-CPO	Technical CPO, part of the CPO role.

1.2.2.1. Reference overview



Editorial Note: This overview is the reference overview of the market en roles on high level as used by the EVRoaming Foundation at the moment of publishing of this version of the Business Use Cases. Specific roles like Smart Charging Service Providers are acknowledged but are not shown in this overview as exact position of these roles is not yet finalized.

1.2.3. Terminology

Term	Description
Administrative CPO	A company that is responsible for tariff information and correct price calculation of a charging session, is responsible for the authorization of charging session and has the roaming contract with the MSP. A subset of the full CPO role.
Charging Pool	One or more EVSEs that are physically grouped at one address and operated by one CPO, so that they form a single destination for an EV driver looking to charge their EV. This concept of Charging Pool corresponds to the "recharging pool" as defined by the Sustainable Transport Forum in [4TIER] .
Charging Limit	A restriction set by the MSP on the time, energy consumption or total cost of a charge session by a driver of that MSP. NOTE: It is still being discussed which limits are feasible for OCPI.
Charging Session	A charging session is a period of time during which an EVSE is exclusively claimed by a certain Driver or vehicle. As such this includes time during which an EVSE is not available to other Drivers or vehicles because of a reservation. For the same reason it also includes time during which a vehicle is parking in an EVSE's parking bay without actually charging the battery.
Charging Station	The Charging Station is the physical system with a single user interface where an electric vehicle can be charged. A Charging Station has one or more EVSEs. This concept of Charging Station corresponds to the "recharging station" defined by the Sustainable Transport Forum in [4TIER] .

Term	Description
Contract Certificate Pool	The CCP stores signed Contract Certificates Bundles. These are provided by the MSP and/or CPS. These can be retrieved by a CPO or OEM or other CCPs.
Driver MSP	When the MSP role is split between two companies, this is the role that manages the relation with the drivers, contract, invoices, RFID cards etc.
EVSE	An EVSE is an independently operated and managed part of a Charging Station that can deliver energy to one EV at a time. This concept of EVSE corresponds to the "recharging point" defined by the Sustainable Transport Forum in [4TIER] .
Location	A Location comprises a Charging Pool, metadata about how the Pool can be used, and information on amenities available on the Charging Pool and around it. There is a one to one relation between Locations and Charging Pools.
National Access Point	Provides a national database with all (public) Charging Pools. Information can be sent and retrieved from the NAP. This makes it different from a typical NSP.
Navigation Service Provider	Provides EV drivers with location information of Charging Stations. Usually only interested in Pool information.
OCPI Platform	A software system that provides OCPI functionality to one or more companies/roles. Also referred to as just Platform in this document. A Hub is also a role on a Platform.
Pool	Short for Charging Pool; see there.
Provisioning Certificate Pool	The PCP is a bridge between the OEMs and EMPs. OEMs can store, update and delete their vehicle certificates. All OEM Provisioning Certificates are accessible by the EMPs to encrypt their customers' contract certificate private key. The Operators can forward the OEMs and EMPs request to the other operators' PCPs if they cannot process the request, e.g., the OEM provisioning certificate could not be found in the PCP.
Roaming MSP	When the MSP role is split between two companies, this is the role that manages the roaming contracts and the technical OCPI connections with roaming partners.
Smart Charging Service Provider	Provides Smart Charging service to other parties. Might use a lot of different inputs to calculate Smart Charging
Technical CPO	A company that is responsible for managing Charging Stations, that is, forwarding charging session information without pricing information to the Administrative CPO. A subset of the full CPO role.

1.2.4. References

In the Business Use Cases we refer to these documents for normative descriptions of how OCPI platforms should behave:

Reference identifier	Title	URL
4TIER	European Alternative Fuels Observatory: Recharging systems	https://alternative-fuels-observatory.ec.europa.eu/general-information/recharging-systems

2. Locations

This section contains the Locations related business use cases. That is, it is about eMSPs', NSPs' and others' ability to provide static and dynamic POI to EV drivers.

Editorial Note: The Business Use Cases related to Locations are split in the different roles as these might have different requirements later when defining Functional Use Cases

B1.1 - As an eMSP I want to have up to date Locations information to be able to show this to interested actors

Objective(s)	1. The eMSP receives up to date Locations information.
Description	When an EV driver is traveling to a place that they never visited before with their vehicle, they want to find a Location that suits the needs, correct connector and expected charging speed, expected business, etc
Actors	CPO, eMSP
Preconditions	
Postconditions	eMSP has up to date information about all Locations of the CPO.
Functional UC	05.01: Replicate Location objects from one Party to another Party
Remark(s)	<p>eMSPs would like to know how EVSEs are grouped into Charging Stations. This is not possible with OCPI 2.2.1 and earlier. eMSPs experience this as a defect because:</p> <ul style="list-style-type: none">* User interface related information, like whether a payment terminal is available, conceptually belongs at the Charging Station level.* Charging Stations, as physically distinct devices offering a single user interface, are more recognizable to Drivers than the physically unembodied EVSEs. Being able to tell which EVSEs are in which Charging Station helps to establish common ground when communicating with Drivers and trying to understand their problems in customer service scenarios.* As a physically distinct device, a Charging Station has its own geographic location and OCPI 3.0 should offer a way to inform the eMSP of this geographic location.

B1.2 - As an NSP I want to have up to date Location information to be able to show this to interested actors

Objective(s)	1. The NSP receives up to date Locations information.
Description	When an EV driver is traveling to a place that they never visited before with their vehicle, they want to find a Location that suits the needs, correct connector and expected charging speed, expected business, etc
Actors	CPO, NSP
Preconditions	

Postconditions	NSP has up to date information about all Locations of the CPO.
Functional UC	05.01: Replicate Location objects from one Party to another Party
Remark(s)	

B1.3 - As an NAP I want to have up to date Location information to be able to show this to interested actors

Objective(s)	1. The NAP receives up to date Locations information.
Description	When an EV driver is traveling to a place that they never visited before with their vehicle, they want to find a Location that suits the needs, correct connector and expected charging speed, expected business, etc
Actors	CPO, NAP
Preconditions	
Postconditions	NAP has up to date information about all Locations of the CPO.
Functional UC	05.01: Replicate Location objects from one Party to another Party
Remark(s)	

B1.4 - As a Data Aggregator I want to have up to date Location information to be able to monitor and forecast charging station usage and availability

Objective(s)	1. The Data Aggregator can generate insights about EV charging infrastructure usage
Description	Owners of charging infrastructure, other stakeholders, or third parties acting on their behalf want to gather as much data as possible about how EV charging infrastructure is used in order to install, maintain and operate such infrastructure more efficiently.
Actors	CPO, AGG
Preconditions	
Postconditions	AGG has up to date Location information
Functional UC	05.01: Replicate Location objects from one Party to another Party
Remark(s)	

B1.5 - As CPO I want to be able to approve or not approve data sharing on request and on behalf of the owner

Objective(s)	1. A CPO can comply with Charging Station owners' wishes and legal requirements regarding sharing data with third parties
Description	OCPI facilitates sharing of information between companies in the EV charging industry. Much of this information is directly or indirectly related to customers. As such customers will want to control how much of their data is shared and sharing this information is subject to data protection laws. OCPI has to make it possible and straightforward for the companies that use it to respect their customers' data sharing wishes and comply with applicable law.
Actors	AGG, CPO, eMSP, NAP, NSP
Preconditions	
Postconditions	No Location data is shared via OCPI Locations in a way that unknowingly contravenes legal regulations on data sharing
Functional UC	<p>OCPI gives CPOs the following limitations and opportunities in the Functional Use Cases to limit the sharing of Location data, in decreasing order of strength:</p> <ul style="list-style-type: none"> * CPOs can choose to not share certain Locations via OCPI. OCPI has no requirement on CPOs to share Locations just because they exist. In fact, requirement R.25.04 requires CPOs to not share private Locations unless the CPO deliberately chooses to allow charging via third-party applications there. * In case of multiple Parties hosted on a single Platform, like on a Roaming Hub, CPOs can address their Locations to a specific Party on such a Platform. The Platform is then only allowed to use the Locations for the operations of that specific Party. This is requirement R.11.19 in the Functional Use Cases. * With the publish and publish_allowed_to field of the Location objects, CPOs can share Locations via OCPI but limit how the receivers of those Locations are allowed to share them further. This is described in the requirements of Functional Use Case 25. * CPOs can tell the receiver of the Location that certain audiences cannot use the Location. CPOs can do this with the parking_restrictions field in the EVSE objects in a Location object. The receiver of the Location object may decide to not share the Location data further if the parking_restrictions value limits access to the Location to a limited audience. There is no guarantee of such limited sharing however.
Remark(s)	

B1.6 - As an eMSP helpdesk agent I want to be able to help an EV Driver by remote control of an EVSE

Objective(s)	1. Make it possible for a helpdesk agent working at the eMSP to help an EV Driver that has problems charging their EV.
Description	When helpdesk agents of the eMSP are able to help an EV Driver with problems at an EVSE, they do not have to call the CPO, this saves time and resources. Commands like: Start Session, Unlock Connector and Reset are solving most of the issues an EV driver might have.
Actors	CPO, eMSP, EV Driver

Preconditions	EVSE supports remote commands
Postconditions	Helpdesk agent was able to help EV driver solve problems during a charging sessions.
Functional UC	The Unlock Connector and Reset operations can be requested using Functional Use Cases 29 and 30. Starting and stopping Sessions is possible using Functional Use Cases 33 and 34.
Remark(s)	

B1.7 - As an eMSP I want to reserve an EVSE for the EV Driver

Objective(s)	1. Enable eMSP to make a reservation of an EVSE for the EV Driver.
Description	The make sure an EV Driver has an EVSE available for charging, when they arrive at a destination, the eMSP needs to be able to reserve an EVSE at that Location for the EV Driver.
Actors	CPO, eMSP, EV Driver
Preconditions	EVSE supports reservations
Postconditions	EVSE is reserved for the driver.
Functional UC	05.02: Reserve an EVSE at a Location
Remark(s)	It should be possible to make a reservation with a start time, when supported by the CPO.

3. Tariffs

This section contains the tariff related business use cases. These use cases provide eMSP, NSP and others with information to be able to inform EV drivers with the tariff that the driver will have to pay if they charge at a certain Location.

Editorial Note: The Business Use Cases related to tariffs are split in the different roles as these might have different requirements later when defining Functional Use Cases

B2.1 - As a CPO I want to inform eMSP's about the roaming tariff

Objective(s)	1. Provide tariff information to the EV driver before or at the start of a charging session when the driver uses an authorization and payment method provided by the eMSP.
Description	An EV Driver should be able to see the tariff he is going to be paying when he charges at a Location. This can be shown on a website, a mobile app etc. The tariff exchanged via OCPI is the roaming tariff agreed between CPO and eMSP. The eMSP might provide a different tariff to the driver, that depends on the contract between the EV Driver and the eMSP.
Actors	CPO, eMSP
Preconditions	
Postconditions	The eMSP is informed about the tariffs at all Locations of a CPO that their drivers are allowed to use.
Functional UC	The eMSP should subscribe to the CPO's Tariffs and Tariff Associations modules according to Functional Use Cases 09.01 and 10.01. The eMSP then receives all the Tariffs used by the CPO. The eMSP will also receive the Tariff Associations that inform them which Tariff applies to which Connector at which time for their eMSP account holders.
Remark(s)	

B2.2 - As a CPO I want to inform NSPs about the ad-hoc tariff

Objective(s)	1. Provide ad-hoc tariff information to the EV driver. This is the tariff paid when using a payment method provided by the CPO.
Description	An EV Driver should be able to see the ad-hoc tariff they are going to be paying when charging at a Location. This can be shown on a website, a mobile app etc. This is the tariff paid when using a local payment method like a debit/credit card terminal at the EVSE, or a mobile app provided by the CPO
Actors	CPO, NSP
Preconditions	
Postconditions	The NSP is informed about the ad-hoc tariffs at all public Locations of a CPO.

Functional UC	The NSP should subscribe to the CPO's Tariffs and Tariff Associations modules according to Functional Use Cases 09.01 and 10.01. The NSP then receives all the Tariffs used by the CPO. The NSP will also receive the Tariff Associations that inform them which Tariff applies to which Connector at which time with ad-hoc payment.
Remark(s)	Tariffs should be possible in "classic" currencies and also cryptocurrencies. Multiple currencies should be possible on the same tariff.

B2.3 - As a CPO I want to inform NAPs about the ad-hoc tariff

Objective(s)	1. Provide ad-hoc tariff information to the EV driver. This is the tariff paid when using a payment method provided by the CPO.
Description	An EV Driver should be able to see the ad-hoc tariff they are going to be paying when charging at a Location. This can be shown on a website, a mobile app etc. This is the tariff paid when using a local payment method like a debit/credit card terminal at the EVSE, or a mobile app provided by the CPO.
Actors	CPO, NAP
Preconditions	
Postconditions	The NAP is informed about the ad-hoc tariffs at all public Locations of a CPO.
Functional UC	The NAP should subscribe to the CPO's Tariffs and Tariff Associations modules according to Functional Use Cases 09.01 and 10.01. The NAP then receives all the Tariffs used by the CPO. The NAP will also receive the Tariff Associations that inform them which Tariff applies to which Connector at which time with ad-hoc payment.
Remark(s)	

B2.4 - As a CPO I want to receive the EV Driver specific tariff and related information from the eMSP to be able to show this on the Charging Station

Objective(s)	1. Show EV driver specific tariff information, provided by the eMSP on the Charging Station. 2. Receive driver specific tariff and max limit information in case of pre-paid charging.
Description	<p>When a Charging Station has a display, and is capable of showing tariff information to an EV Driver The CPO might want to show the tariff the driver has to pay to his eMSP.</p> <p>In such case, before charging is started, the driver will need to accept the tariff shown.</p> <p>In case of pre-paid charging the EVSE and/or CPO will need to know the tariff and limits that they have to take into account for the EV Driver for this session.</p>
Actors	CPO, eMSP, EV Driver
Preconditions	Charging Station capable of showing driver specific tariffs.

Postconditions	EV Driver knows tariff he has to pay for using the Charging Station.
Functional UC	The CPO should agree with the eMSP to use real-time authorization as specified in 11.02 <i>Ask for real-time charge authorization</i> . The eMSP can then give the Tariff to the CPO in the <code>display_tariff</code> field of the AuthorizeResponse object that the eMSP sends to the CPO.
Remark(s)	

B2.5 - As an eMSP or NSP I want to display OCPI Tariffs in a human-readable form to Drivers

Objective(s)	1. Given an OCPI Tariff object, eMSPs and NSPs can create a human understandable description of it that makes Drivers understand what they will pay for charging.
Description	As an eMSP, I want to display an OCPI Tariff in a driver app in a way that Drivers understand, in order to build trust with my Drivers that I am fair and transparent to them.
Actors	eMSP, NSP
Preconditions	The eMSP or NSP is receiving OCPI Tariffs.
Postconditions	The eMSP or NSP can create human-understandable descriptions of these Tariffs.
Functional UC	09.01 <i>Replicate Tariff objects from one Party to another Party</i>
Remark(s)	<p>OCPI will not describe one way to create a description from a Tariff, as this task doesn't lend itself to a single solution due to the many different human languages and forms of presentation.</p> <p>Still OCPI can make it easier for eMSPs and NSPs to render Tariffs in human-understandable form by designing the Tariff object schema with the following principles in mind:</p> <ul style="list-style-type: none"> * Precision - given a Tariff object, there should be no room for different interpretations, so that there is a single interpretation that can be automatically turned into text or another presentation without the need for a human interpretation step. * Familiarity - Parties already have algorithms to turn Tariff objects from earlier OCPI versions into human-understandable forms, and by keeping OCPI 3.0 Tariff objects similar to earlier OCPI versions' Tariff objects, the accumulated knowledge in these existing algorithms can be reused. * Simplicity - Tariff objects should be kept as simple as commercially and legally possible, so that they can be fully represented in a short bit of text or a simple infographic.

B2.6 - As a CPO I want to announce a future tariff change to an eMSP

Objective(s)	1. eMSPs, NSPs and NAPs know beforehand that a CPO is going to change the tariff for charging at some of their charging infrastructure, so that the eMSP can inform their Drivers or react commercially before the tariff change takes effect.
Description	As a CPO, I want to share a future tariff change with eMSPs, NSPs and NAPs so that I am sure that they already know these Tariffs when they become applicable and so that eMSPs can inform their Drivers beforehand if they so desire.

Actors	eMSP, CPO, NSP, NAP
Preconditions	The CPO has a Tariff change planned
Postconditions	The CPO's roaming partners (eMSPs, NSPs and NAPs) know about the planned Tariff change
Functional UC	<p>First the CPO has to make sure that their roaming partners know about the newly applicable Tariff itself using Functional Use Case 09.01 <i>Replicate Tariff objects from one Party to another Party</i>.</p> <p>Then the CPO has to announce that at some point in the future, this Tariff is going to apply to a certain set of Connectors by sending a Tariff Association using Functional Use Case 10.01 <i>Replicate Tariff Association objects from one Party to another Party</i>.</p>
Remark(s)	

B2.7 - As an eMSP I want to check a CPO's computed session fee

Objective(s)	1. When an eMSP receives a session or a CDR, they can compute the session fee themselves from the Tariff and consumption information in these objects, in order to check if the session fee given by the CPO is correct.
Description	As an eMSP, I want to verify the session fee that is charged to me by a CPO in order to prevent me from being charged too much (or worse, me charging my Driver too much and thus losing customer trust because of a CPO's mistake).
Actors	eMSP, CPO
Preconditions	The eMSP receives a session or CDR object from the CPO.
Postconditions	The eMSP computed the session fee for that session or CDR based on the tariff and consumption information in these objects.
Functional UC	<p>First, the CDR or Session to check and the Tariffs and Tariff Associations that apply to them have to be replicated from the CPO to the eMSP according to:</p> <ul style="list-style-type: none"> * 09.01 <i>Replicate Tariff objects from one Party to another Party</i>, * 10.01 <i>Replicate Tariff Association objects from one Party to another Party</i>, * 07.01 <i>Replicate Session objects from one Party to another Party</i>, and * 08.01 <i>Replicate CDR objects from one Party to another Party</i>. <p>Then the eMSP can check the cost computed by the CPO according to Functional Use Case 08.04 <i>Check CDR price</i>.</p>

Remark(s)	<p>This has to be achieved by designing the Tariff, Tariff Association, Session and CDR object schemas to allow for this. Some properties that we have to make sure that the Tariff, Tariff Association, Session and CDR schemas satisfy:</p> <ul style="list-style-type: none"> * It is clear which Tariff applies to a Session when it starts. * The CPO should not be able to change the applicable Tariff for a session after the session has started. * There should always be one single applicable Tariff per session. * It should be clear in the Session and CDR objects which fields are input to session fee computation and which fields are output. * The Tariff objects should leave no room for interpretation. That is, they should unambiguously describe a mathematical function from Session objects to session fees.
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B2.8 - As a CPO I want to announce what tariffs apply when and where separately from the tariffs or the locations themselves

Objective(s)	1. CPOs can announce changes in which tariffs apply, at what pieces of charging infrastructure, at which time, and for whom, separately from the information they share about their charging infrastructure or their tariffs by themselves.
Description	As a CPO, I want to apply a certain tariff to a certain set of EVSEs for a certain audience without modifying the tariff or locations data in order to give clear tariff information while avoiding data duplication.
Actors	eMSP, CPO, NAP, NSP
Preconditions	The CPO already shared tariff and location information to roaming partners (eMSPs, NAPs and/or NSPs).
Postconditions	The CPO informed a roaming partner of a change in the applicable tariff at some of their infrastructure, without modifying the tariff data or locations data they shared previously.
Functional UC	10.01 <i>Replicate Tariff Association objects from one Party to another Party</i>
Remark(s)	

B2.9 - As an eMSP, NAP or NSP I want to present my Drivers with a Tariff timeline

Objective(s)	1. eMSPs, NAPs or NSPs enable their Drivers to make informed decisions about where and when to charge by informing them of Tariff changes before they happen.
Description	As an eMSP, I want to present my Drivers with a timeline of what tariffs will apply for them at which time at a given Connector.
Actors	eMSP, NAP, NSP
Preconditions	The eMSP, NAP or NSP received complete Location, Tariff and Tariff Association information from the Connector's CPO.

Postconditions	The eMSP, NAP or NSP presents Drivers with a timeline view of their Tariffs at a certain Connector, or presents the same information in an equivalent presentation.
Functional UC	<p>First, the eMSP, NAP or NSP has to get all the Locations, Tariffs and Tariff Associations according to Functional Use Cases 05.01 <i>Replicate Location objects from one Party to another Party</i>, 09.01 <i>Replicate Tariff objects from one Party to another Party</i> and 10.01 <i>Replicate Tariff Association objects from one Party to another Party</i>.</p> <p>Then, in order to present a timeline for a given Driver at a given Connector, the eMSP, NAP or NSP has to:</p> <ol style="list-style-type: none"> 1. Select from all the Connector's CPO's Tariff Associations only those that apply to the given Connector, 2. Select from all the Tariff Associations selected at step 1, only those that apply for the Driver according to the values of the Tariff Associations' audience fields, 3. Eliminate from the Tariff Associations selected at step 2, all those Tariff Associations that have the same value for the start_datetime as another Tariff Association in the set but were last received from the CPO at an earlier time, 4. Order the Tariff Associations selected at step 2 by start_datetime. 5. A timeline of the applicable Tariffs for the Driver can now be presented based on the sequence obtained at step 4. For each Tariff Association in the sequence, the Tariff referenced by that Tariff Association will be in effect for the Driver at the Connector from the value of the start_datetime field of that Tariff Association until the value of the start_datetime field of the next Tariff Association in the sequence, or indefinitely if there is no next Tariff Association in the sequence.
Remark(s)	See also Functional Use Case 08.04 <i>Check CDR price</i> . The algorithms given in that use case and the one given in this use case are designed to be consistent. The description in Functional Use Case 08.04 is more precise, so if there are any interpretation questions about this Business Use Case, the interpretation that is consistent with Functional Use Case 08.04 should be chosen.

4. Authorization

This section contains the authorization related business use cases.

B3.1 - As an eMSP I want EV Drivers to be able to charge their EV using a local form of authentication

Objective(s)	1. Enable EV drivers that have a contract with an eMSP to charge their EV at an EVSE operated by a CPO by using a local form of authentication.
Description	An EV Driver should be able to start and stop a charging session using any method provided by the eMSP and supported by the EVSE and the CPO. This can be RFID Tokens (also using the memory on the RFID), 15118 Plug&Charge, AutoCharge provided by the eMSP etc. This can be based on a list of Tokens send to the CPO as a whitelist, but can also be using real-time authorization. Whitelisted tokens might be limited to certain countries.
Actors	CPO, eMSP, EV Driver
Preconditions	Authorization method, for example RFID Token or 15118 Certificate, provided by eMSP.
Postconditions	EV Driver is able to charge his vehicle using the provided authentication method.
Functional UC	The eMSP issues the Token for local authentication to CPOs using Functional Use Case 11.01 <i>Replicate Token objects from one Party to another Party</i> . Doing the actual authentication from there on is something between the Driver. OCPI does not go into further detail about the authentication mechanism.
Remark(s)	Using a mobile app is a different use case as this uses a different communication pattern. With an app start, the Driver is authenticated by the eMSP and it is the MSP that contacts the CPO to start the session for the Driver. With this local authorization use case, the authentication happens between Driver and CPO at the Charging Station.

B3.2 - As an eMSP I want to migrate my EV Drivers to another MSP

Objective(s)	1. Enable eMSPs to migrate tokens from one MSP to another.
Description	When an eMSP buys another MSP, the existing Tokens might need to be migrated from one OCPI platform to another. CPOs need to be made aware that the Tokens are no longer managed by the first eMSP, so Sessions and CDR need to be sent to the new MSP.
Actors	eMSP, CPO
Preconditions	One eMSP already issued a Token to one CPO
Postconditions	The CPO knows that the Sessions and CDRs for charging with the Token now need to be sent to another eMSP

Functional UC	<p>An eMSP A can migrate a Token of theirs to an eMSP B with these steps:</p> <ol style="list-style-type: none"> 1. eMSP A updates the Token with a date in the valid_until field of the Token object using Functional Use Case 11.01 <i>Replicate Token objects from one Party to another Party</i>. 2. eMSP B issues a Token object with the same values in the uid and contract_id fields and with a value for the valid_from_date field that is shortly before the valid_until_date of the Token object from eMSP A. This is again done using Functional Use Case 11.01 <i>Replicate Token objects from one Party to another Party</i>. 3. The dates given in the Tokens' valid_until and valid_from fields expire. 4. The Token is now transferred. <p>This means that transfer happens token-by-token. This means a lot of communication is needed for large datasets. We believe that that drawback is offset by the advantages of staying within the bilateral paradigm of OCPI (no three-way operations, only communication between two parties at a time) and executing the migration gradually.</p> <p>There may be small customer-visible side effects of the migrations, like unpredictability of which eMSP will handle a session if it falls within a window between the valid_from date of the new MSP's token and the valid_until of the old eMSP's token. We believe that such visible side effects can be dealt with with clear communication from the eMSPs to their customers and other partners.</p>
Remark(s)	

B3.3 - As a Roaming Hub I want to provide whitelist Token services to eMSPs and CPOs

Objective(s)	<ol style="list-style-type: none"> 1. Enable Roaming Hubs to provide whitelist services to eMSPs and CPOs. 2. Prevent CPOs from having to ask every eMSP if a token is allowed to charge.
Description	<p>All eMSPs on a Roaming Hub send all their Tokens to the Roaming Hub, these Tokens are not forwarded to the CPOs.</p> <p>CPOs can then ask the Roaming Hub if a token used by an EV driver is allowed to charge, without having to ask this to all eMSPs.</p>
Actors	Roaming Hub, eMSP, CPO
Preconditions	
Postconditions	
Functional UC	<p>This can be achieved by:</p> <ol style="list-style-type: none"> 1. A Hub Platform subscribes to eMSPs' tokens in the name of their Hub Party ID, using Functional Use Cases 11.01 and 03.10. 2. The Hub now stores the Tokens they receive from these eMSPs. 3. The CPOs will make real-time authorization calls to the Hub (Functional Use Case 11.02) and the Hub can answer based on their stored Tokens.
Remark(s)	The Roaming Hub Whitelist Service prevents business strategic information (amount of customers) from eMSPs having to be shared with CPOs.

B3.4 - As CPO I want to provide GDPR: 'Right of access' and 'Right to be forgotten'

Objective(s)	<ol style="list-style-type: none">1. Enable eMSPs to ask CPOs for information, so they can comply to GDPR: Right of access.2. Enable eMSPs to ask CPOs to "remove" information, so they can comply to GDPR: Right to be forgotten.
Description	Companies need to comply to GDPR legislation. For this they need to provide 'Right of access' and 'Right to be forgotten' to their customers. For this they need the companies they work with to be able to provide this to them.
Actors	eMSP, CPO
Preconditions	
Postconditions	
Functional UC	There are no specific Functional Use Cases for GDPR compliance.
Remark(s)	<p>Newer generations of EV charging standards are designed to require ever less sharing of personal data. Using IEC 15118 and OCPI 3.0, CPOs no longer need to receive data on Charge Tokens that are usable on their network before they are actually used.</p> <p>A full analysis of what the 'Right of access' and 'Right to be forgotten' mean in a CPO - eMSP relation was not conducted as part of OCPI 3.0 development. Complying with this legislation, and finding out how exactly this can be done, remains a responsibility of Parties operating in a jurisdiction where the GDPR applies.</p>

B3.5 - As an eMSP I want the EV Drivers to be able to charge their EV using my mobile app

Objective(s)	<ol style="list-style-type: none">1. Enable Drivers to use an eMSP mobile app to charge their EV.
Description	An EV Driver should be able to start/stop a charging session using the mobile App provided by their eMSP.
Actors	CPO, eMSP, EV Driver
Preconditions	EV Driver has registered in the eMSP mobile app. The eMSP has established a roaming connection via OCPI to the CPO
Postconditions	EV Driver was able to start/stop a charging sessions using the eMSP mobile app.
Functional UC	07.02 <i>Start a Session</i> 07.03 <i>Stop a Session</i> 07.04 <i>Change Charging Preferences</i>
Remark(s)	

B3.6 - As a CPO I want EV Drivers to be able to charge their EV using Plug and Charge with IEC 15118

Objective(s)	1. Enable EV drivers to operate EV Charging Stations with a Plug and Charge experience.
Description	To make this happen, an EV Driver should be able to authenticate for starting and stopping a Charging Session using an IEC 15118 Contract Certificate. In OCPI, these Contract Certificates are treated as an authentication mechanism in which the EMA-ID (defined in IEC 15118) plays the role of the Charging Token. This use case is thus a special case of use case B3.1 with the local token in this case being the EMA-ID.
Actors	CPO, eMSP, EV Driver
Preconditions	Driver is plugged in, and the vehicle supports IEC 15118, and the EVSE supports IEC 15118, and the CPO can successfully authenticate the EMA-ID by checking the Contract Certificate.
Postconditions	A Charging Session starts, authenticated with Plug and Charge according to IEC 15118.
Functional UC	<p>After the CPO has checked the certificate and thereby authenticated the EMA-ID, the CPO makes a real-time authorization request according to Functional Use Case 11.02 <i>Ask for real-time charge authorization</i>.</p> <p>The CPO should put the EMA-ID, in its shortest possible string representation, in the <code>token_uid</code> field of the AuthorizeRequest object. The CPO should also fill in <code>EMAID</code> in the <code>type</code> field of the AuthorizeRequest. The CPO should send the real-time authorization request to the eMSP that has the Party ID that forms the first five character of the EMA-ID.</p> <p>To send tariff information to the CPO so that the CPO can pass it on to the vehicle according to IEC 15118, the eMSP can fill in the <code>display_tariff</code> field in the AuthorizeResponse object.</p>
Remark(s)	This high-level description applies regardless of whether the vehicle and the CPO use IEC 151182-2 or IEC 15118-20.

5. Sessions

This section contains the Charging Sessions related business use cases. These use cases focus on giving eMSPs the ability to provide EV drivers with information during an ongoing Charging Sessions.

B4.1 - As an eMSP I want to be informed about ongoing Charging Sessions by the CPO so that I can keep the EV Driver informed during charging

Objective(s)	1. Provide information about an ongoing Charging Session from CPO to eMSP to enable the eMSP to inform the EV driver about the amount of energy, cost etc.
Description	During an ongoing Charging Session, started by the EV driver using an authorization method or App provided by the eMSP, the CPO provides the eMSP with updated information about the Charging Sessions, so the eMSP can keep the EV driver informed. This information can also be used to limit the cost made by the driver if the eMSP wants to limit this. This information can be, but not limited to: amount of energy charge, running cost, expected charge rate for the rest of the session.
Actors	CPO, eMSP, EV Driver
Preconditions	Authorization method provided by the eMSP
Postconditions	
Functional UC	07.01 <i>Replicate Session objects from one Party to another Party</i>
Remark(s)	

B4.2 - As an eMSP I want to set charging limits for the Charging Session on certain quantities so that the eMSP can offer to the EV driver a pre-paid offer

Objective(s)	1. Enable eMSP to set charging limits on a Charging Session, so the session is automatically stopped when a certain limit is reached.
Description	An EV Driver should be able to charge his/her EV using a pre-paid account. Charging should stop (before) the pre-paid account is empty.
Actors	CPO, eMSP, EV Driver
Preconditions	Ongoing Charging Session
Postconditions	EV is charged and account is not negative

Functional UC	<p>To work according this use case, an eMSP should issue their Tokens according to Functional Use Case 11.01 <i>Replicate Token objects from one Party to another Party</i> with the whitelist field set to NEVER or ALLOWED_OFFLINE. This makes that CPOs will make real-time authorization requests before they let a Session happen with one of the Tokens.</p> <p>Then when a real-time authorization request happens according to Functional Use Case 11.02 <i>Ask for real-time charge authorization</i>, the eMSP can set charging limits by supplying values for the max_energy and max_time fields in the real-time authorization response.</p> <p>How to compute the energy and time limits given in these fields from the Driver's available pre-paid credits is the eMSP's concern. OCPI does not provide guidance with it.</p> <p>If and how the limits are enforced, in turn, is the CPO's concern.</p>
Remark(s)	

B4.3 - As a Data Aggregator I want to be informed about ongoing Charging Sessions

Objective(s)	1. Provide pseudonymized Charging Sessions information to a Data Aggregator
Description	A company/organization, for example site owner or research institute, wants to receive session information of all or a set of EVSEs. This data should be pseudonymized so it cannot be directly linked to a person.
Actors	CPO, Data Aggregator
Preconditions	
Postconditions	
Functional UC	<p>07.01 <i>Replicate Session objects from one Party to another Party</i>.</p> <p>For pseudonymization, a tool like the EV Roaming Foundation's OCPI data tool can be used.</p> <p>If the Data Aggregator is interested in power and/or electricity data, they can use Functional Use Cases from chapter 13, <i>Power Regulation</i>, to obtain such data about Charging Sessions.</p>
Remark(s)	<p>For this data to be shared, their might need to be a contract between eMSP and CPO that allows data sharing with other parties.</p> <p>Pseudonymized means that this data itself is anonymized, but if combined with another anonymized source the data can be linked to a person.</p>

B4.4 - As an eMSP I want to send a message to my EV Driver at an EVSE

Objective(s)	1. Show a message on the EVSE (if possible) for the EV driver
Description	<p>There can be different reasons to show a message on the display of an EVSE for the driver.</p> <p>Could also be used to show the actual eMSP tariff on the display of the EVSE (Charging Station)</p>

Actors	CPO, eMSP, EVSE, EV Driver
Preconditions	EVSE Support displaying of custom messages
Postconditions	Message for EV Driver shown on display of the EVSE
Functional UC	07.07 <i>Send Message for Driver About Session to CPO</i>
Remark(s)	

B4.5 - As a CPO I want to send a message to an EV Driver of an eMSP, related to a Charging Session

Objective(s)	1. Send a message to an EV Driver that is charging (or has a reservation) at an EVSE of this CPO.
Description	When something or some event happens during charging (or a reservation period), and the CPO wants to notify the EV driver of this, the CPO needs a way to notify the driver. The eMSP can have different ways to notify a driver, notification in a mobile App, email and/or SMS etc.
Actors	CPO, eMSP, EV Driver
Preconditions	
Postconditions	
Functional UC	07.06 <i>Send Message for Driver About Session to eMSP</i>
Remark(s)	

6. CDRs

This section contains the CDR related business use cases. The CDR provides the final receipt after a sessions has ended.

B5.1 - As an MSP I want to receive a receipt after the charging session has ended, to show to the EV Driver

Objective(s)	1. Provide a receipt to the EV driver with the actual cost of the charging session after the session has ended.
Description	Provide the EV Driver with the actual cost of the charging sessions after the session has ended with a couple of minutes. This needs to contain the EVSE location, total cost, cost breakdown, cost per charging period, timestamp, duration, amount of energy charged, VAT: amount, percentages and VAT per cost type etc. Each CDR should clearly state if it relates to: expense payment, commercial transaction, or a free transactions. This data can be signed to provide support for legislation like the German Eichrecht.
Actors	CPO, MSP, EV Driver
Preconditions	The CPO and eMSP have an active roaming connection and the CPO is sending CDRs to the eMSP. Charging session from the EV driver has ended
Postconditions	EV Driver has received the 'receipt'
Functional UC	08.01 <i>Replicate CDR objects from one Party to another Party.</i> The CDR object for the Driver's Charging Session contains all the information that will go on such a receipt, it's up to the MSP to create a receipt based on this information.
Remark(s)	The MSP needs to accept or dispute a received CDR via OCPI.

B5.2 - As an MSP I want to receive all the CDRs for invoicing purposes

Objective(s)	1. MSPs want to bill their EV Drivers periodically. For this, MSPs need to receive CDRs for all their EV Drivers. 2. MSPs need to be able to accept or reject every CDR. 3. MSPs want to automate the process of validating (and/or creating) invoices from/to CPOs. For this, all CDRs need to be received for all their EV Drivers at a CPO.
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Description	<p>MSPs want to bill their EV Drivers periodically. For this, invoices need to be generated. MSPs need either to validate invoices received from CPO, or in case of reverse billing, need to be able to generate invoices.</p> <p>For the different invoices, all CDRs for this previous period need to be available to the MSP before the billing run starts.</p> <p>MSPs want to automate these processes as much as possible. OCPI should support this automation as much as possible.</p> <p>MSPs should be able to accept or reject/dispute a CDR. When the MSP rejects/disputes the CDR, they need to provide a reason and description, why a CDR is rejected/disputed.</p>
Actors	CPO, MSP
Preconditions	<p>The CPO and eMSP have an active roaming connection and the CPO is sending CDRs to the eMSP.</p> <p>At least one charging session from EV driver contracted by MSP has ended during relevant period</p>
Postconditions	MSP has received all the CDRs for a period.
Functional UC	<p>08.01 <i>Replicate CDR objects from one Party to another Party</i></p> <p>12.01 <i>Replicate Invoice Reconciliation objects from one Party to another Party</i></p> <p>08.03 <i>Dispute a CDR</i></p>
Remark(s)	

B5.3 - As a CPO I want to tell an eMSP which CDRs of mine go on which invoice (or vice versa)

Objective(s)	<p>1. When an eMSP receives an invoice from a CPO, the eMSP is able to look up which CDRs are supposedly invoiced on this invoice according to the CPO, in order to reconcile the invoice.</p> <p>2. When reverse billing is used between a CPO and an eMSP, and the CPO receives an invoice from an eMSP, the CPO is able to look up which CDRs are supposedly invoiced on this invoice according to the eMSP, in order to reconcile the invoice.</p>
Description	When Parties receive invoices, they want to reconcile these with their records of transactions to check if the amount is justified. In order to do so, they have to know which CDRs are being invoiced with a certain invoice.
Actors	CPO, eMSP
Preconditions	<p>The CPO and eMSP have an active roaming connection and the CPO is sending CDRs to the eMSP.</p> <p>One of the two Parties has invoiced the other for roaming transactions.</p>
Postconditions	The Party who received the invoice knows which CDRs the invoice sender means to invoice with the invoice.
Functional UC	12.01 <i>Replicate Invoice Reconciliation objects from one Party to another Party</i>
Remark(s)	

B5.4 - As an eMSP I want to be sure that the measured data I receive in CDRs from a CPO is correct

Objective(s)	When an eMSP receives a CDR from a CPO, the eMSP has relative certainty that the measured quantities given in the CDR are correct.
Description	eMSPs do not want to end up paying for consumption that did not truly happen. OCPI allows CPOs to use cryptography and provide links to resources outside OCPI to instill confidence in eMSPs that the quantities given in CDRs are correct.
Actors	CPO, eMSP
Preconditions	The CPO and eMSP have an active roaming connection and the CPO is sending CDRs to the eMSP.
Postconditions	The eMSP receiving CDRs is confident that the measured quantities given in the CDR are correct.
Functional UC	<p>The following Functional Use Cases play a role here:</p> <ul style="list-style-type: none">* 01.02 <i>Establish secure connection</i> makes sure that OCPI messages are transmitted securely and will not be altered in transit.* 05.01 <i>Replicate Location objects from one Party to another Party</i> gives the CPO the opportunity to share proof of calibration of the meters in their Charging Stations. This is given in the <code>calibration_info_url</code> field of the EVSE object.* 08.01 <i>Replicate CDR objects from one Party to another Party</i> gives the CPO the opportunity to included signed meter readings in the <code>signed_data</code> field of the CDR object. This mechanism is not standardized into great detail in OCPI because the market has so far failed to agree on a single system of signing and checking digitally transmitted meter readings.
Remark(s)	See the remark about checking the physical quantities that CPOs allege were consumed under Functional Use Case 08.04 <i>Check CDR price</i> .

7. Smart Charging

This section contains the smart charging related business use cases. Providing SCSPs and other parties with the ability to influence the charging speed of a charging sessions.

B7.1 - As an SCSP I want to influence an ongoing charging session

Objective(s)	1. Give an SCSP to influence an ongoing charging session, by providing Session information to the SCSP and enabling the SCSP to send Charging Profiles via the CPO to the EVSE.
Description	SCSP need to be able to do smart charging, so sending charging profiles to the CPO to request activation on EVSE for an ongoing charging session. For this the SCSP needs to know and be updated of ongoing charging sessions on an EVSE. The SCSP needs to know if other (local) systems are influencing the charging sessions. V2G/V2X should also be possible.
Actors	CPO, SCSP, EVSE
Preconditions	Ongoing charging sessions
Postconditions	
Functional UC	<p>This can be done by letting the SCSP obtain Location and/or Charging Session information. To do that, the SCSP has to subscribe to either or both of these data types using one or both of the use cases:</p> <ul style="list-style-type: none">* 05.01 <i>Replicate Location objects from one Party to another Party</i>, and* 07.01 <i>Replicate Session objects from one Party to another Party</i>. <p>With the Location and/or Session information that they thus obtained, the SCSP can then set Charging Profiles using:</p> <ul style="list-style-type: none">* 13.02 <i>Set a Charging Profile on a grouping of EVSEs</i>,* 13.03 <i>Set a Charging Profile on a Charging Session</i>, and/or* 13.06 <i>Clear Charging Profile</i>.
Remark(s)	Typical use case in a scenario where the CPO out source the smart charging profile calculation to an external company.

B7.2 - As an SCSP I want to be informed about ongoing charging sessions

Objective(s)	1. Provide (Pseudonymized) charging sessions information to a SCSP, so the SCSP can provide charging profiles to the CPO.
Description	For the SCSP to be able to influence charging session as defined in use case: B73, the SCSP needs to be made aware of new charging sessions and updates to ongoing charging sessions.
Actors	CPO, SCSP
Preconditions	
Postconditions	SCSP has up to date information of ongoing charging sessions.

Functional UC	<p>In order to learn which Sessions are happening, the SCSP can subscribe to Session objects using Functional Use Case 07.01 <i>Replicate Session objects from one Party to another Party</i>.</p> <p>In order to learn about the power with which charging is happening in these Sessions, the SCSP should subscribe to MeterReading objects using Functional Use Case 13.01 <i>Replicate MeterReading objects from one Party to another Party</i>.</p>
Remark(s)	

B7.3 - As a Grid Operator I want to receive meter value information from Locations from the CPO

Objective(s)	1. Provide the Grid Operator with energy usage/information of Locations
Description	For balancing the grid and local electricity markets, the Grid Operator needs to know how much energy is being used at which locations in the grid. This information can be reported every X minutes (typical 15 minutes) even when no charging sessions is ongoing. Information that can be useful to be shared: kWh values, frequency etc, taken from the grid energy meter, or if not available, the combined values of all combined meters at the Location.
Actors	CPO, Grid Operator
Preconditions	
Postconditions	
Functional UC	The Grid Operator can receive energy usage information from the CPO using Functional Use Case 13.01 <i>Replicate MeterReading objects from one Party to another Party</i> .
Remark(s)	

B7.4 - As an SCSP I want to set a Charging Profile for a whole Location

Objective(s)	1. Reduce the difficulty of making power flexibility at the Pool available to balance supply and demand in the power grid.
Description	As a Smart Charging Service Provider (SCSP), I want to send a Charging Profile for a whole Pool at once, in order to reduce the difficulty of making power flexibility at the Pool available to balance supply and demand in the power grid.
Actors	SCSP, eMSP, CPO
Preconditions	
Postconditions	

Functional UC	<p>The following Functional Use Cases are used here:</p> <ul style="list-style-type: none"> * 05.01 <i>Replicate Location objects from one Party to another Party.</i> * 13.02 <i>Set a Charging Profile on a grouping of EVSEs.</i> <p>It is up to the SCSP to subscribe to the Locations module to learn which EVSEs are in which Locations. It can then use the <i>Set a Charging Profile on a grouping of EVSEs</i> use case to set a Charging Profile on the set of EVSEs that constitutes one Location.</p>
Remark(s)	

B7.5 - As an SCSP I receive power constraints for a Location

Objective(s)	1. The SCSP learns what the power constraints are on a Location in order to know the boundaries within which they can regulate charging power on charging stations there.
Description	<p>We could report the power grid connection constraints without involving the concept of Pool, just per charging station. Or group charging stations in a way that is independent from the Driver-directed grouping used in the Pools module. We may have to do that for some use cases too.</p> <p>But assuming that there is one power grid connection per Pool that imposes a limit on the combined EVSEs in the Pool seems a common, intuitive situation that the OCPI protocol has to facilitate where it applies.</p> <p>We wondered if OCPI is the right place for transferring this type of information. The status quo now seems to be that information about grid connection constraints is transferred in a non-standardized way, using emails and spreadsheets and the like.</p> <p>The OpenADR and OSCP protocols are also used for this general functional area but they are of course not integrated with the OCPI Pools module like we are proposing here.</p> <p>The advantages of solving this in OCPI are therefore:</p> <ol style="list-style-type: none"> 1. It's possible to tie smart charging constraints to the Pool concept, which makes things more intuitive. 2. CPOs don't have to implement other power constraint management protocols besides OCPI.
Actors	SCSP, eMSP, CPO
Preconditions	
Postconditions	
Functional UC	05.01 <i>Replicate Location objects from one Party to another Party.</i> The SCSP will find the power constraints for the Location in the <code>max_power</code> field if the CPO is supplying them.
Remark(s)	

B7.6 - As an SCSP I manage a virtual grouping of EVSEs

Objective(s)	1. The SCSP controls the power on a group of EVSEs whose grouping makes sense to them but not to other actors, in order to make optimal use of EVSEs for balancing the power grid.
Description	Sometimes an SCSP wants to group EVSEs by other properties than their physical grouping. Other groupings relevant for an SCSP may include: whether the EVSEs are linked to local PV production or not, whether the EVSEs are attached to local battery storage or not, which energy supplier the power for the EVSE is bought from, DC fast EVSEs vs AC regular EVSEs, etc.
Actors	SCSP, eMSP, CPO
Preconditions	
Postconditions	
Functional UC	13.02 <i>Set a Charging Profile on a grouping of EVSEs</i>
Remark(s)	

B7.7 - As an SCSP, I want to set a default profile for an EVSE

Objective(s)	1. The SCSP sets a default profile for an EVSE in order to know and control what will happen when a new charge session starts there.
Description	<p>Previous versions of OCPI were developed with the principle that the default profile is the CPO's business. We see however that the CPO and the SCSP both have different use cases for a default profile:</p> <ul style="list-style-type: none"> * The CPO wants to set a default profile in order to set limits on how fast the EVSE can ever charge to protect the local power circuit; whereas * The SCSP wants to set a default profile in order to know what happens when a new session starts and to make this new session blend in with their power management immediately. <p>This also means that the SCSP's default profile should not overwrite the CPO's default profile. Instead, the SCSP's default profile can only specify additional constraints that stay within the limits set by the CPO.</p>
Actors	SCSP, eMSP, CPO
Preconditions	
Postconditions	
Functional UC	13.04 <i>Set Default Charging Profile</i>
Remark(s)	

7.1. B7.8 - As an SCSP, I want to learn how fast a CPO is actually planning to make their EVSEs charge

Objective(s)	1. The SCSP learns the CPO's Active Charging Profile in order to make adjustments to my profiles to account for deviations that the CPO may have to make from my earlier profiles.
Description	
Actors	SCSP, CPO
Preconditions	
Postconditions	
Functional UC	13.05 <i>Get Active Charging Profile</i>
Remark(s)	

7.2. B7.9 - As an eMSP I want to give restrictions to a CPO when I start a charge session with my token on their network

Objective(s)	1. Make sure the Session meets the Driver's charging needs when smart charging is used.
Description	In OCPI 2.2.1 there were already some fields on the charge token that allow the eMSP to give some of the Driver's charging preferences to the CPO, but this remained rather static and limited.
Actors	eMSP, CPO
Preconditions	
Postconditions	
Functional UC	07.04 <i>Change Charging Preferences</i>
Remark(s)	

7.3. B7.10 - As an eMSP I want to be informed about active smart charging in a session of a Driver of mine

Objective(s)	1. Give the Driver insight into smart charging on their session via e.g. a phone app on the Driver's phone.
Description	As of OCPI 2.2.1, the OCPI sessions module already allows the CPO to send data about the charging rate. It doesn't explicitly relate this to smart charging processes though.
Actors	eMSP, CPO
Preconditions	
Postconditions	
Functional UC	07.05 <i>Notify Session receiver of the active Charging Profile</i>
Remark(s)	

8. Connections

This section contains the connection/security related business use cases.

B8.1 - As an OCPI Platform I want to have a secure connection with all other OCPI Platforms

Objective(s)	<ol style="list-style-type: none">1. Setting up a secure connection between two OCPI Platforms.2. Maintaining a secure connection between two OCPI Platforms.
Description	The connection setup between two platforms should be secure and preferably via an industry standard protocol/framework. The connection should remain secure over time, so likely security credentials will need to be renewed every X days.
Actors	OCPI Platforms
Preconditions	
Postconditions	Connection between the two platforms is secured.
Functional UC	<p>First the Platforms exchange credentials according to Functional Use Case 01.01: <i>Initial credentials exchange (manual)</i>. Then they can set up a secure connection according to Functional Use Case 01.02: <i>Establish secure connection</i>.</p> <p>Credentials can be renewed using Functional Use Case 01.04: <i>Renew certificate</i>. OCPI sets no maximum validity period for credentials, beyond what is implied by the references to TLS and the NCSC's guidelines for TLS. Functional Use Case 01.05: <i>Terminate OCPI connection</i> offers a way to terminate the OCPI connection gracefully.</p>
Remark(s)	

B8.2 - As an OCPI Platform I want to publish an updated list of role(s)

Objective(s)	<ol style="list-style-type: none">1. Publish to connected platforms that new role(s) are now available.2. Publish to connected platforms that role(s) are no longer available.
Description	<p>When a new OCPI role has been setup (CPO, MSP, NSP etc) and is now available, or a role is no longer available, this should be published to connected platforms. So they can start to work with the new role.</p> <p>When an OCPI role is no longer available on a platform, the contract with a Hub might have ended, or the company started to use a different SaaS provider. This should be published, in time, to connected platforms. So they now this role is no longer available on this platform. The removal of a role may never affect ongoing charging sessions, so it should be published in time</p>
Actors	OCPI Platforms
Preconditions	Existing connection between two OCPI platforms

Postconditions	Other Platform has the updated list of role(s).
Functional UC	Platforms have to poll their partner Platforms for the roles that they offer using Functional Use Case 02.01: <i>Request Parties served by Platform</i> .
Remark(s)	With OCPI 3.0 the goal is to also support the communication between the split CPO and MSP roles: A-CPO (Administrative CPO) to/from T-CPO (Technical CPO) and D-MSP (Driver MSP) to/from R-MSP (Roaming MSP).

B8.3 - As an OCPI Platform I want to keep updated of connections to a Hub

Objective(s)	<ol style="list-style-type: none"> 1. Hubs publish the available roles of other connected platforms. 2. Hubs publish the connection status of other connected platforms.
Description	When a platform, connected to a Hub has a new role available.
Actors	OCPI Platform, Hub
Preconditions	Existing connection between OCPI Platform and Hub.
Postconditions	OCPI Platform is up to date with the connection status between the Hub and all other OCPI Platforms.
Functional UC	<p>Platforms have to poll their partner Platforms for the roles that they offer using Functional Use Case 02.01: <i>Request Parties served by Platform</i>.</p> <p>Unlike OCPI 2.2.1, OCPI 3.0 does not distinguish "Hub Clients" from non-hub roles of a platform. OCPI 3.0 only considers Platforms hosting Parties and has no concept of "Hub Clients".</p>
Remark(s)	

B8.4 - As an OCPI Platform I want to be able to validate received OCPI data has not been altered.

Objective(s)	<ol style="list-style-type: none"> 1. Enable OCPI Platforms to validate the received data is not altered. 2. Enable OCPI Platforms to authenticate the signature of received data.
Description	<p>When an OCPI Platform receives data it needs to be able to check if the content is not altered by a not trusted party. If data is signed by a role on a platform, the authenticity of that signature should be validated, and also the content of that data.</p> <p>Data does not always have to be signed by the source, there are valid use cases where for example a Hub enriches data. In such cases the enriching party can sign the data, if the receiving platform trusts and allows this, the platform can still check the signature of the enriching party.</p>
Actors	OCPI Platforms
Preconditions	

Postconditions	Authenticity and correctness of received data is validated.
Functional UC	<p>This Business Use Case was not implemented. The reason is that there was, at the time that OCPI 3.0 was written, no accepted standard for generating signatures from JSON data. Parties will have to trust the Platforms they connected to and the Parties hosted on them.</p> <p>Note that the HTTP traffic carrying OCPI's JSON payloads is encrypted and signed by TLS using the Platforms' TLS certificates. So Platform-to-Platform communication is signed, but Party-to-Party communication can be tampered with by the OCPI Platforms handling it. This was deemed an acceptable risk in the current state of the industry. As noted in the description above, this also enables many valid use cases for Roaming Hubs and SaaS providers.</p>
Remark(s)	

B8.4 - As an OCPI Party hosted on some OCPI Platform I want to migrate to another Platform

Objective(s)	1. Enable parties in the EV Roaming ecosystem to switch to another OCPI Platform
Description	Sometimes a Party wants to connect to their roaming partners through another OCPI Platform. Examples would be a Party who ran on a Platform they developed themselves but switches to a SaaS Platform, or vice versa.
Actors	Any OCPI Party. Especially also Roaming Hub and actors who provide OCPI Platforms as SaaS.
Preconditions	A Party is hosted by one Platform so that the Party's roaming partners can exchange OCPI messages with the Party via that Platform.
Postconditions	A Party is hosted by another Platform so that the Party's roaming partners can exchange OCPI messages with the Party via that Platform.
Functional UC	See below.
Remark(s)	

Mapping to Functional Use Cases

This Business Use Case is implemented using multiple Functional Use Cases from the Registration and Party Issued Objects chapters from the Functional Use Cases document.

The step-by-step process using the Functional Use Cases for the Party and a roaming partner depends on whether the Party and the roaming partner want to have simultaneous Party Issued Object subscriptions to the old and to the new Platform or if they prefer to shut down the old Platform's subscriptions before they establish the subscriptions on the new Platform. The advantage of working with simultaneous subscriptions is that it avoids downtime. The drawback of working with simultaneous subscriptions is that it is more complicated.

With simultaneous subscriptions the process is like this:

1. The Party notifies its roaming partners that they are switching to the new Platform. They should inform their partners of the date that they will not be hosted on the old Platform anymore and the date from which they will be hosted on the new Platform. There should be a transition period in which the Party is hosted on both Platforms.

2. After the transition period begins, the Parties make sure there is a connection between the Party's new Platform and the roaming partner's Platform. Setting up a connection between Platforms is done according to Functional Use Cases 01.01 *Initial credentials exchange (manual)*, 01.02 *Establish secure connection*, 01.03 *Handshake OCPI connection parameters* and 02.01 *Request Parties served by Platform*.
3. The roaming partner establishes Party Issued Object subscriptions to the Party on the new Platform for the modules that they need, as described in chapter "Party Issued Objects" of the Functional Use Cases. Now the roaming partner will have simultaneous subscriptions for the same Party ID and module, distinguished only by the Platform that is subscribed to. It is now up to the roaming partner's Platform to compartmentalize this data by sending Platform, and to let the roaming partner decide which Platform's data to use. If the roaming partner's Platform does not support such compartmentalization by Platform, the process without simultaneous subscriptions must be used instead. The subscriptions are established using Functional Use Case 03.01 *Subscribe to Party Issued Objects of a certain Module of a certain Party* or the Hub-oriented variants of that use case that are numbered 03.10, 03.11 and 03.12.
4. The Party's new Platform sets up the subscriptions from the Party to the roaming partner's Platform. This is the same as step 4, but for the subscriptions going in the other direction.
5. The Party and the roaming partner now switch the source of truth for their business operations from the old suscriptions' data to the new subscriptions' data. They also start sending requests for business operations like live authorization or EVSE reservations via the new Platform.
6. The roaming partners terminate their subscriptions to objects of the Party to the old Platform using Functional Use Case 03.04 *Cancel a Subscription as the Platform receiving data*. Alternatively these subscriptions can be cancelled by the Party's platform using Functional use Case 03.05 *Cancel a Subscription as the Platform sending data*.
7. The Party cancels their subscriptions from the old Platform to the roaming partner's platform using Functional Use Case 03.04 *Cancel a Subscription as the Platform receiving data*. Alternatively these subscriptions can be cancelled by the Party's platform using Functional use Case 03.05 *Cancel a Subscription as the Platform sending data*.
8. At this point the migration is functionally complete. If connection between the Party's old Platform and the roaming partner's Platform is not in use for other roaming connections, one of the Platforms may terminate it using Functional Use Case 01.05 *Terminate OCPI Connection*.

Without simultaneous subscriptions the process is like this:

1. The Party notifies its roaming partners that they are switching to the new Platform. They should inform their partners of the date that they will not be hosted on the old Platform anymore and the date from which they will be hosted on the new Platform. There does not have to be a transition period in which the Party is hosted on both Platforms.
2. If the Party's new Platform and the roaming partner's Platform are not connected yet, an OCPI connection between the Platforms must be created using Functional Use Cases 01.01 *Initial credentials exchange (manual)*, 01.02 *Establish secure connection*, 01.03 *Handshake OCPI connection parameters* and 02.01 *Request Parties served by Platform*.
3. All subscriptions between the Party on the old Platform and the roaming partner must be cancelled using Functional Use Case 03.04 *Cancel a Subscription as the Platform receiving data* or Functional Use Case 03.05 *Cancel a Subscription as the Platform sending data*. After executing this step, the roaming integration between the Party and the roaming partner is down until steps 4 and 5 are completed.
4. The Party sets up subscriptions from the new Platform using Functional Use Cases 03.01, 03.10, 03.11 or 03.12.
5. The roaming partner sets up subscriptions to the new Platform using Functional Use Cases 03.01, 03.10, or 03.12.

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6. At this point the migration is functionally complete. If connection between the Party's old Platform and the roaming partner's Platform is not in use for other roaming connections, one of the Platforms may terminate it using Functional Use Case 01.05 *Terminate OCPI Connection*.

The coordination of the process, like the exchange of Platform URLs and credentials, is not automated using OCPI. The Party and their roaming partner will have to get in touch using other means of communication than OCPI.

9. Loyalty

This section contains the loyalty related business use cases.

B9.1 - As a CPO I want to give loyalty to EV drivers

Objective(s)	1. Making it possible for CPOs to give loyalty (points) to EV drivers for charging at their Charging Stations.
Description	CPO might want to be able to give loyalty (points) to EV drivers when using Charging Stations.
Actors	CPO, MSP, EV Driver
Preconditions	
Postconditions	EV Drivers has received loyalty (points).
Functional UC	This Business Use Case was not implemented in the Functional Use Cases for lack of Contributor input.
Remark(s)	