OCPP 61850 Use Cases

Author	Robert de Leeuw
Company	ELaadNL
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Contents

1. Introduction

This document is an analyses of how OCPP and 61850 could work together in relevant EV use cases.

By working out a number of use cases for different architectures, we hope to show how OCPP and 61850 can work together. Identify gaps in the protocols, missing data or functionality. This document can be the base for future extensions of these protocols.

This document continues the work, started during the workshop in November 2015 in Paris.

In chapter: 2 different relevant architectures are given.

All the use cases written down during the session are worked out in detail in chapter: 3. For every use case the different architectures are taken into account.

1.1. Terms and Abbreviations

61850	IEC Standard for communication with DSO equipment
BEMS	Building Energy Management System
CPO	Charge Point Operator
DSO	Distribution System Operators
eMSP	Electric Mobility Service Provider
OCPP	

2. Architectures

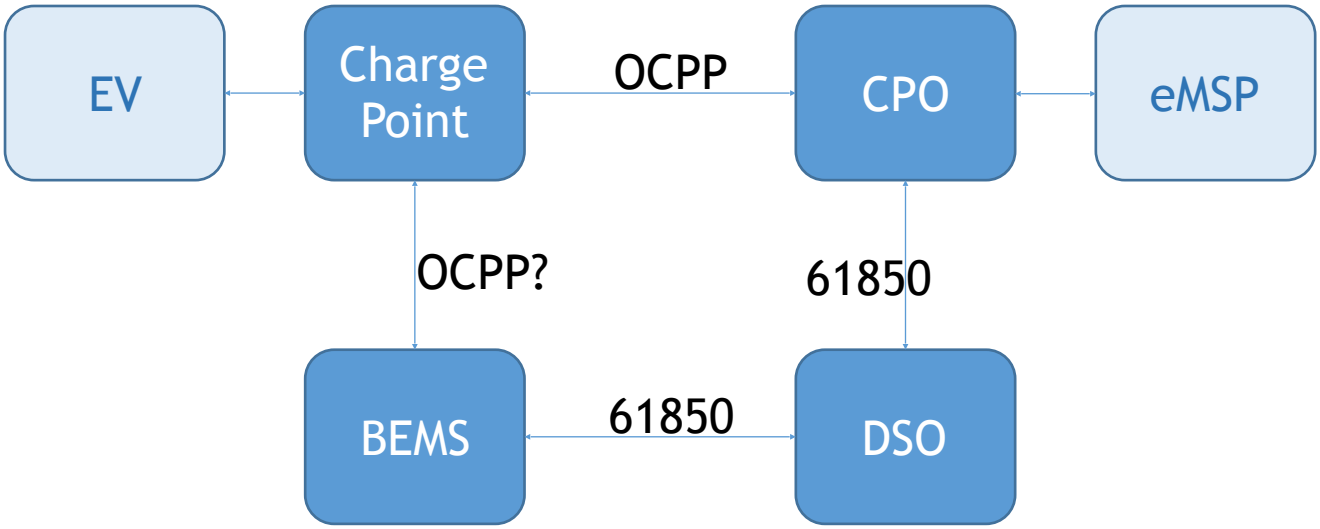
In all the architectures below, OCPP is used for Charge Point management, transactions and authorization related messages. 61850 is used for controlling the amount of energy used by the charge points.

A Charge Point can be simple with only 1 EVSE/connector, or a big charging plaza with tens of EVSEs/connectors connector to 1 local controller.

2.1. Commercial Charge Point with BEMS

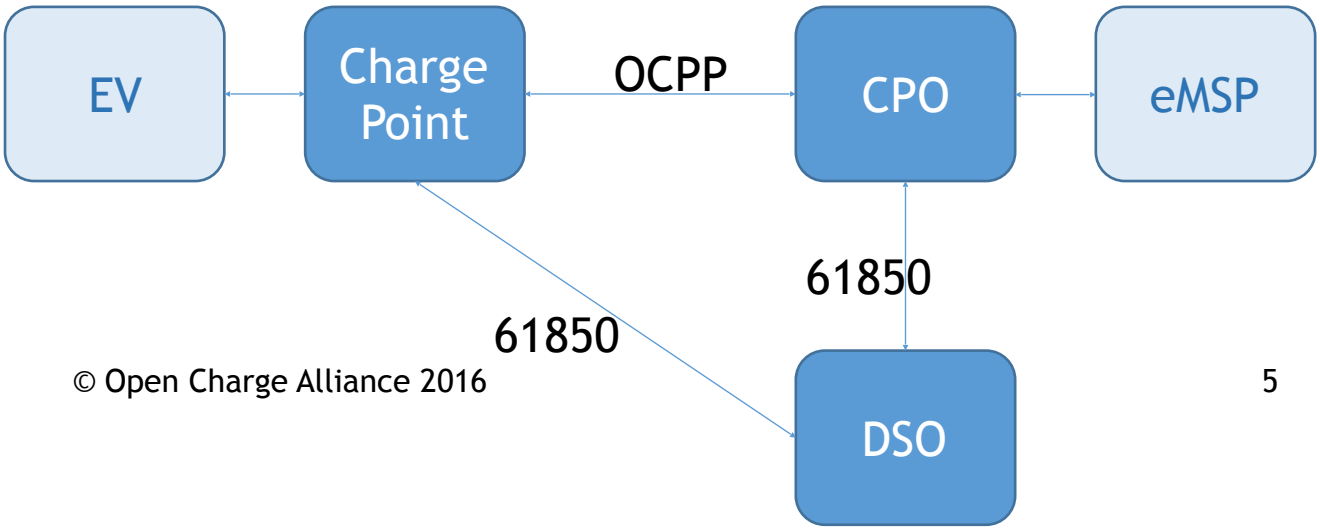
Typical architecture for a number of charge points in a Parking garage in the basement of an office building. The office building has a BEMS controlling the energy usage of the building. The BEMS will also control the amount of energy used by the Charge Points.

For this document this architecture is not taken into account, for the view of the DSO, the communication over 61850 will look the same as for the architecture without a BEMS (see: 2.2). Adding the BEMS to the sequence diagrams would only make them harder to read but would not add extra information.



2.2. Public Charge Point without BEMS

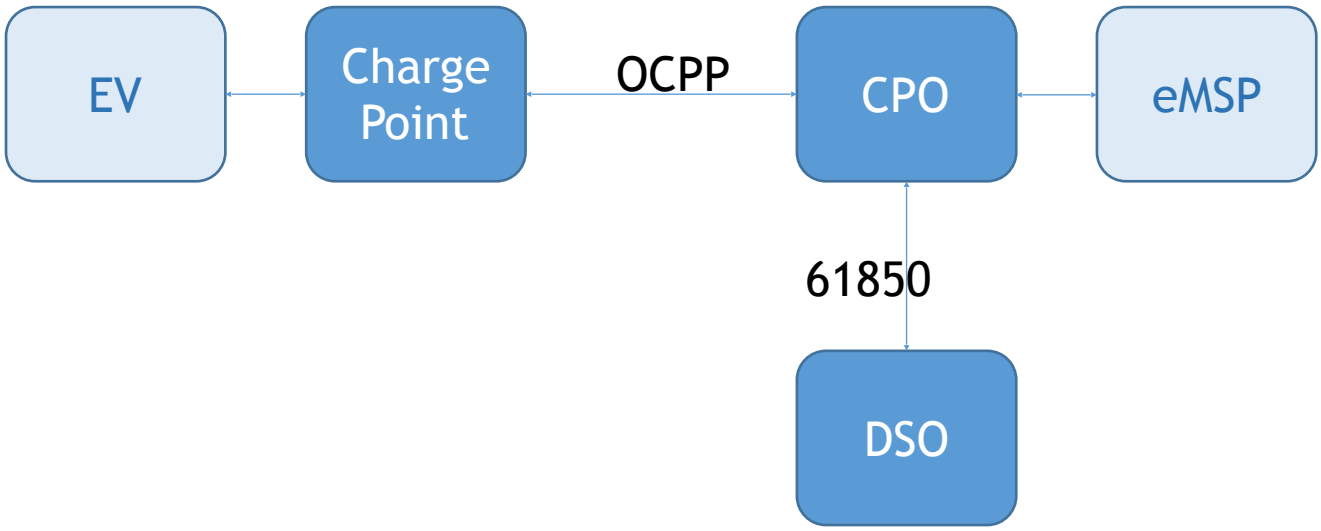
Typical architecture for an open parking area with a number of Charge Points. No BEMS available, so for energy control the DSO has to talk 61850 to the Charge Points directly.



2.3. Residential Charge Point

Typical architecture for a charge point in a number of charge points in a Parking garage in the basement of an office building.

Because a residential charge uses only a limited amount of energy it is not interesting for the DSO to be able to switch of this load. So there is no requirement to control the load directly via 61850.



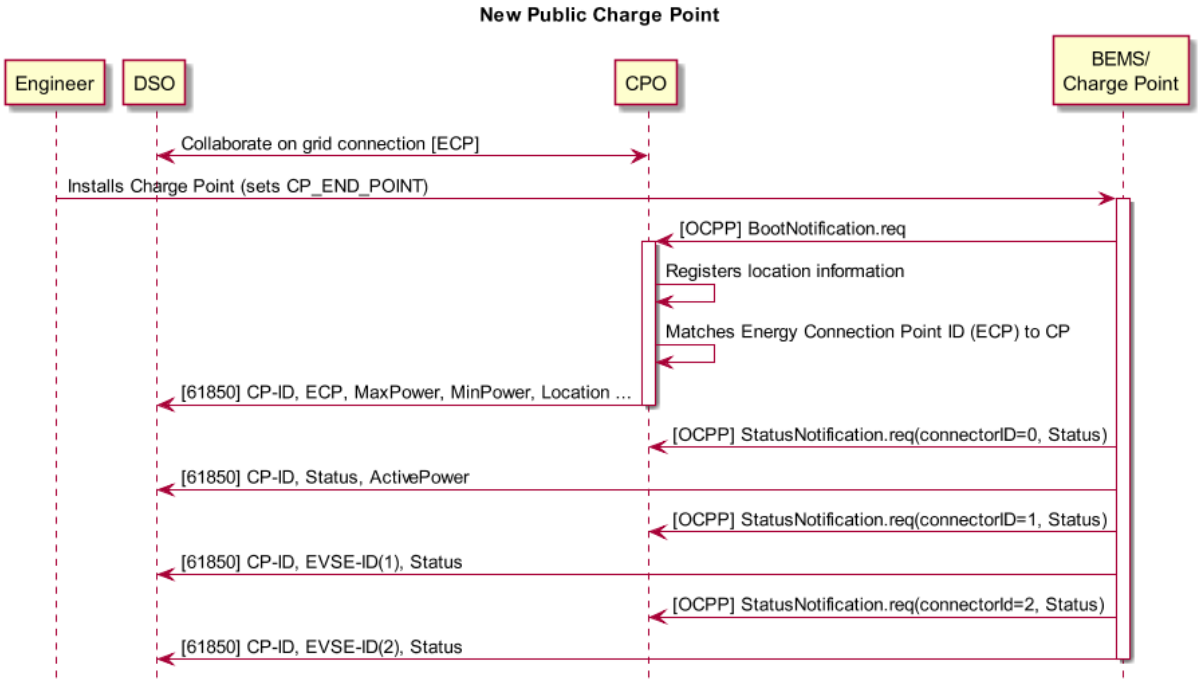
3. Use Cases

The conformation messages (without extra information) on both OCPP and 61850 are taken out of the Sequence Diagrams to simplify them.

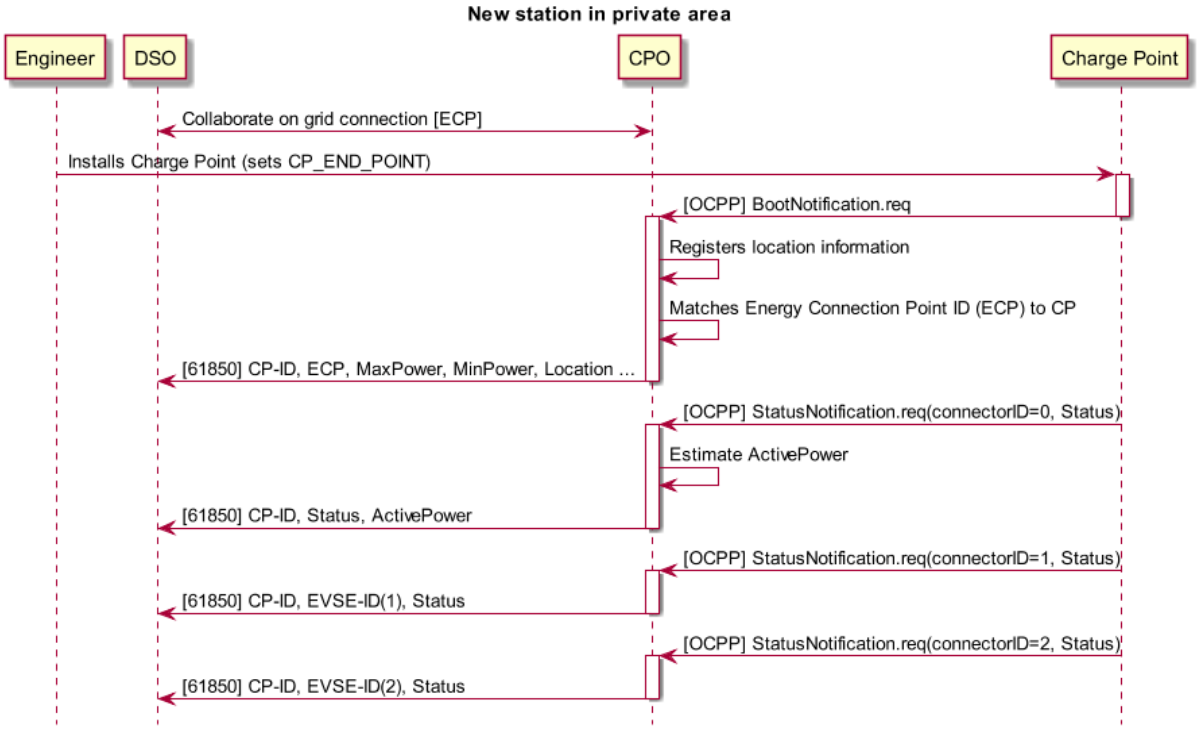
3.1. Register New Charge Point

This use case describes how a new Charge Point is connected to the Central System of the CPO and how all relevant system receive information about a new Charge Point.

3.1.1. Public Charge Point



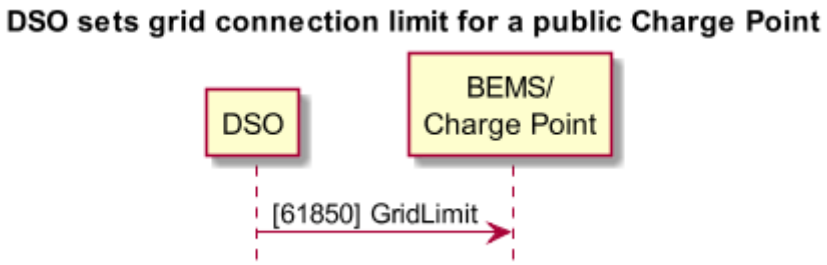
3.1.2. Residential Charge Point



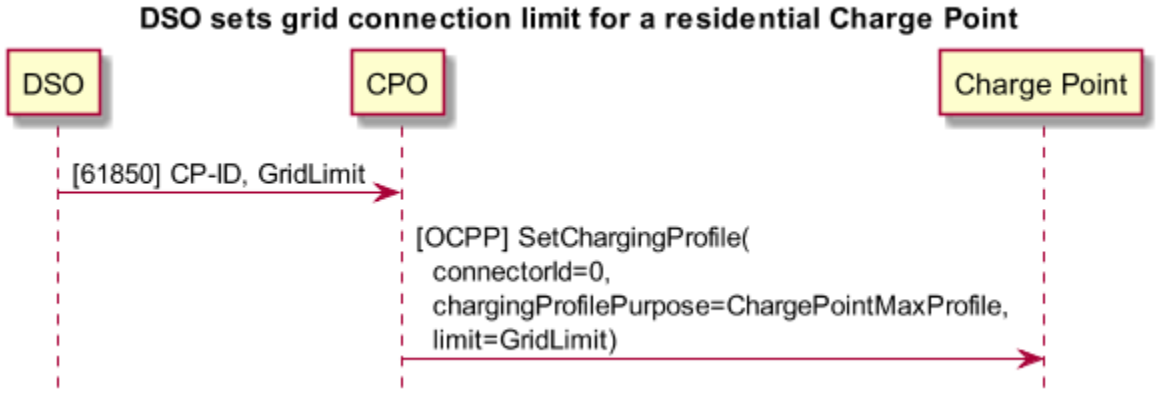
3.2. DSO sets grid connection limit

This use case describes how a DSO can set a grid connection limit in a Charge Point

3.2.1. Public Charge Point



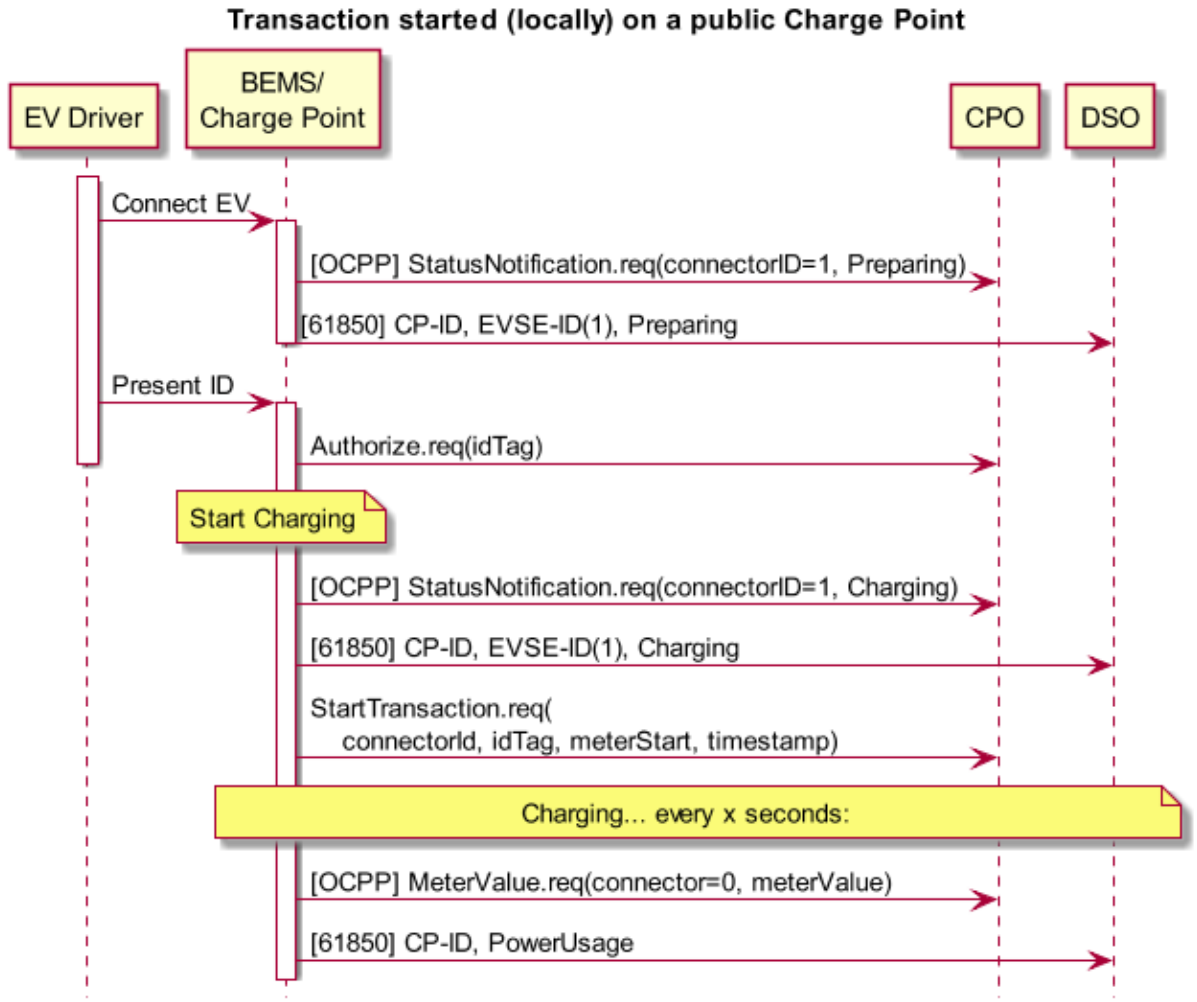
3.2.2. Residential Charge Point



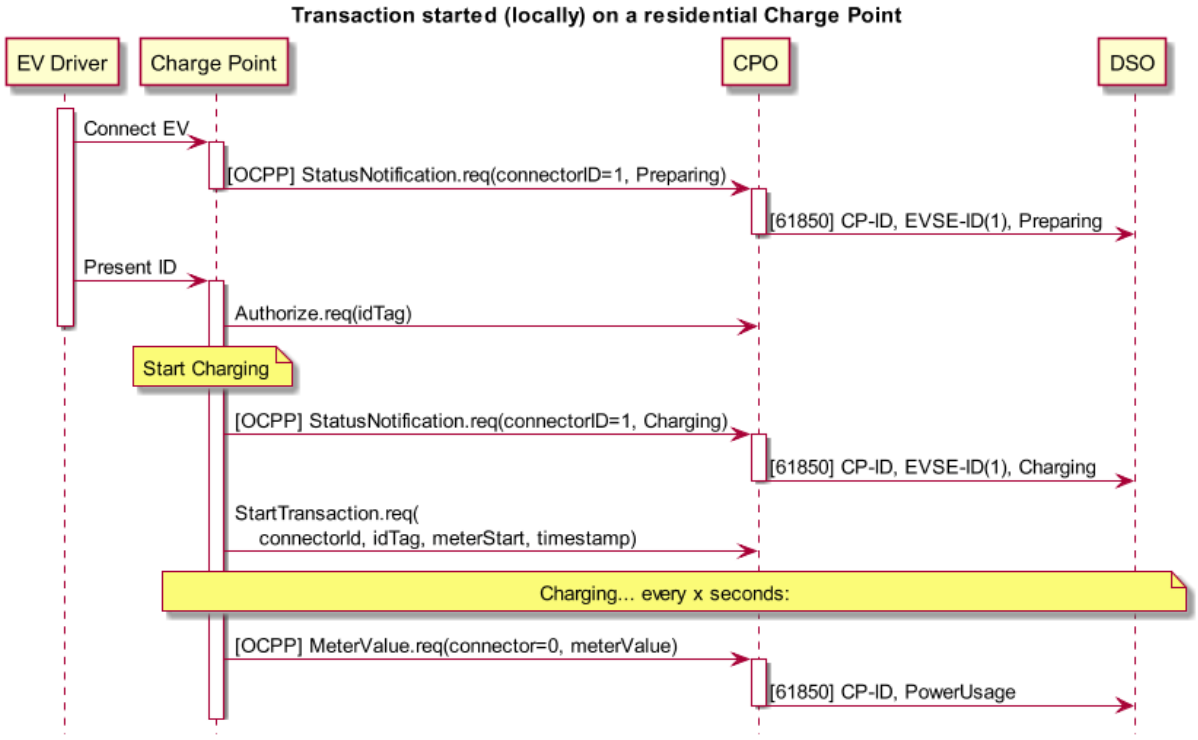
3.3. Start transaction (incl. charging/metering)

This use case describes how a standard locally started transaction works and how notification about the new transaction and the charging of the EV are send to the various systems.

3.3.1. Public Charge Point



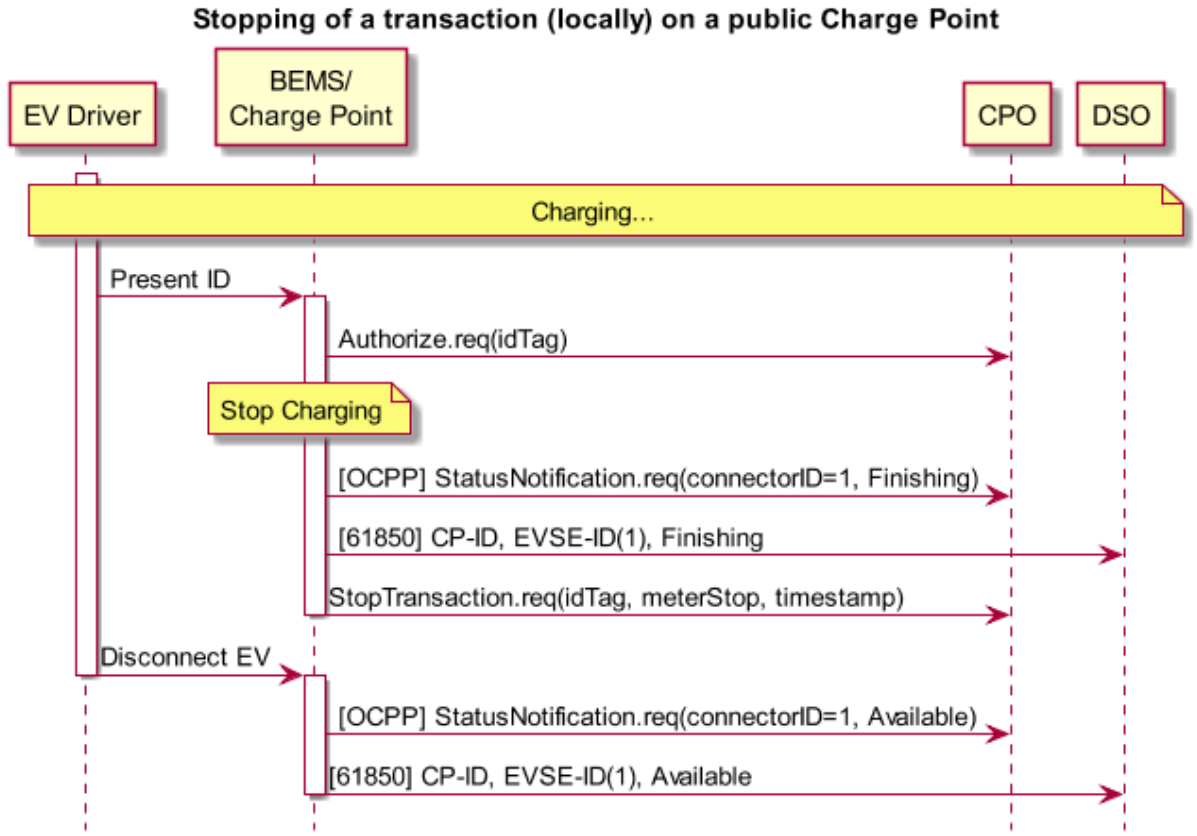
3.3.2. Residential Charge Point



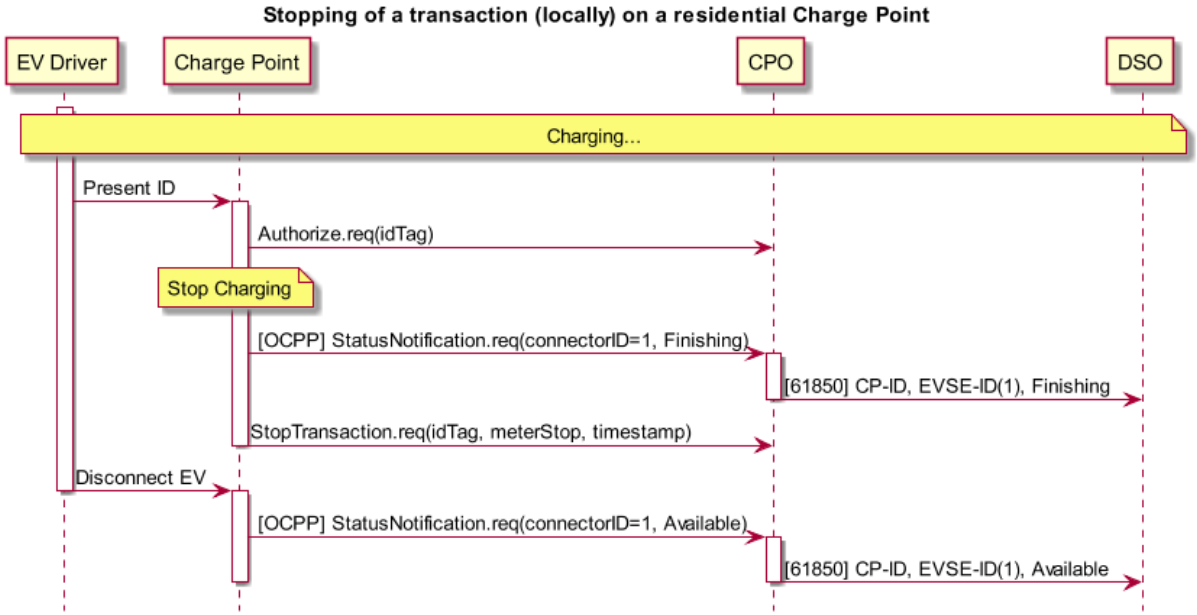
3.4. Stop transaction

This use case describes how a standard locally stop transaction works and how notification about the stop transaction are send to the various systems.

3.4.1. Public Charge Point



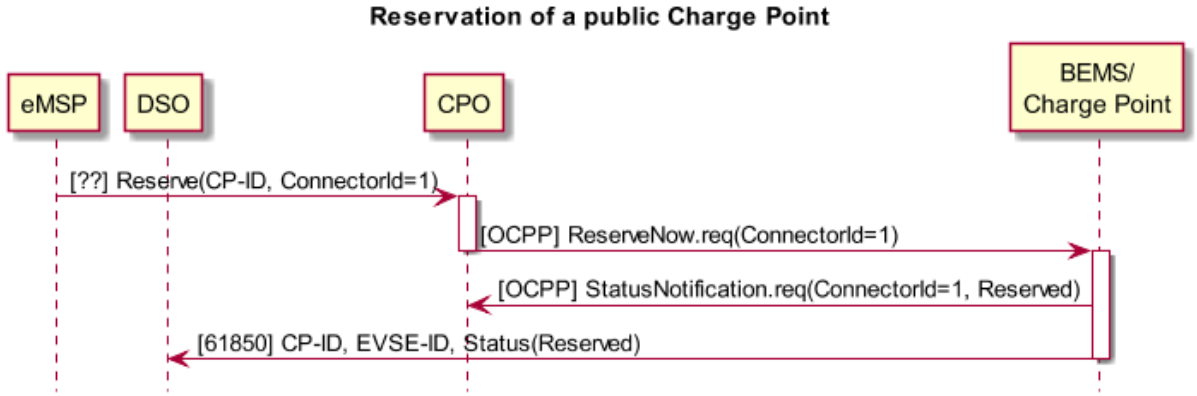
3.4.2. Residential Charge Point



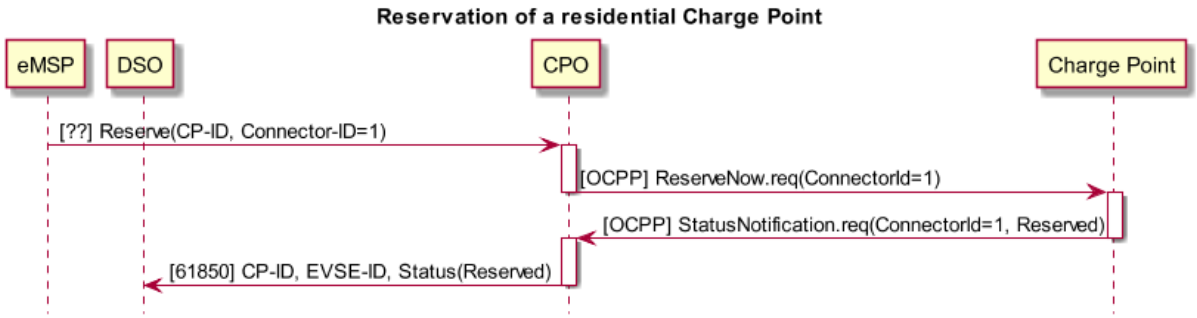
3.5. Reservation

This use case describes how a reservation of a charge point works and how the various systems are notified about this.

3.5.1. Public Charge Point



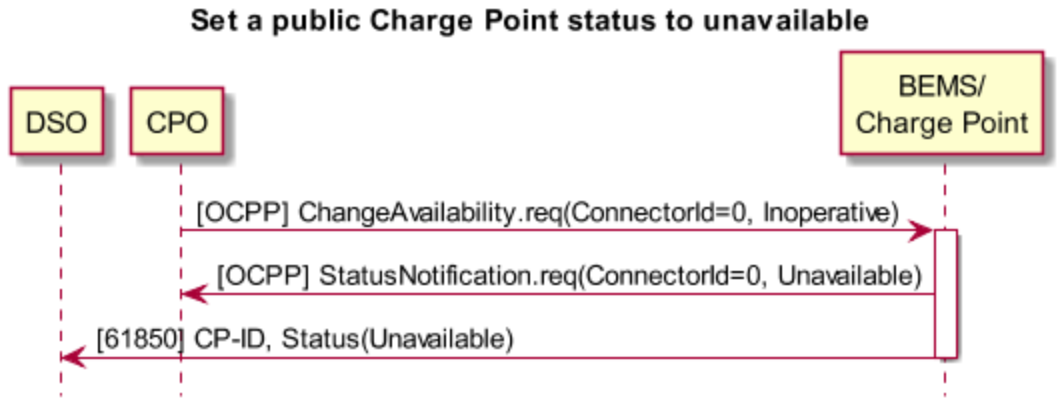
3.5.2. Residential Charge Point



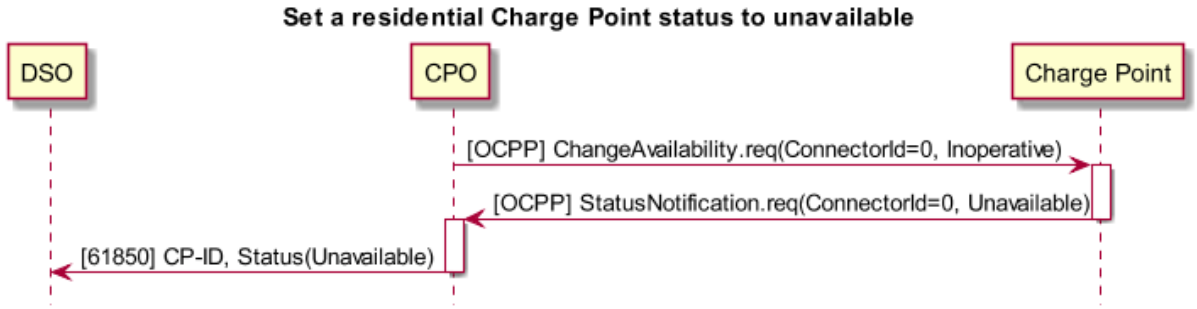
3.6. Set Charge Point status ((Un) Available)

This use case describes how, and who can set a Charge Point status, and what events/ updates are send to the various systems.

3.6.1. Public Charge Point



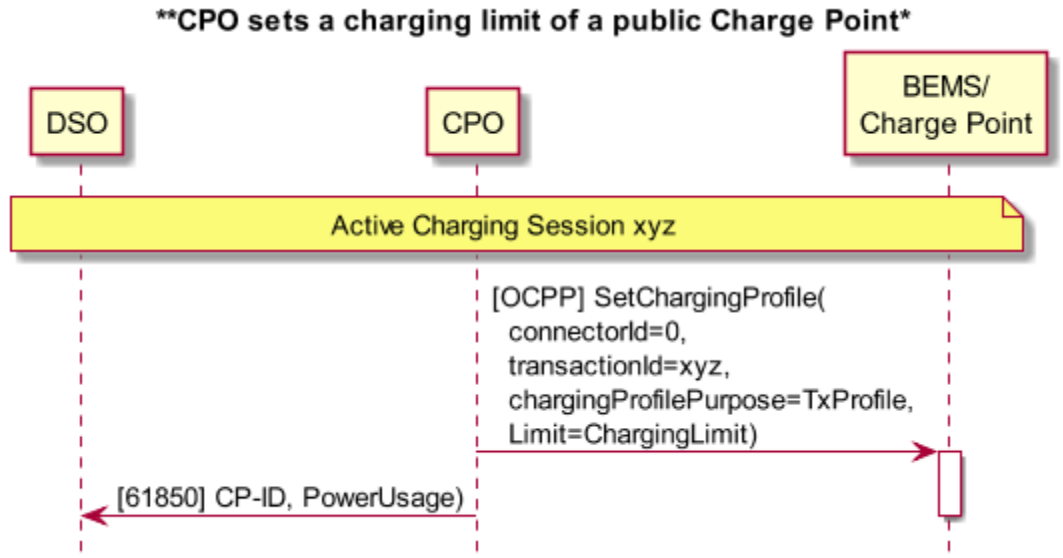
3.6.2. Residential Charge Point



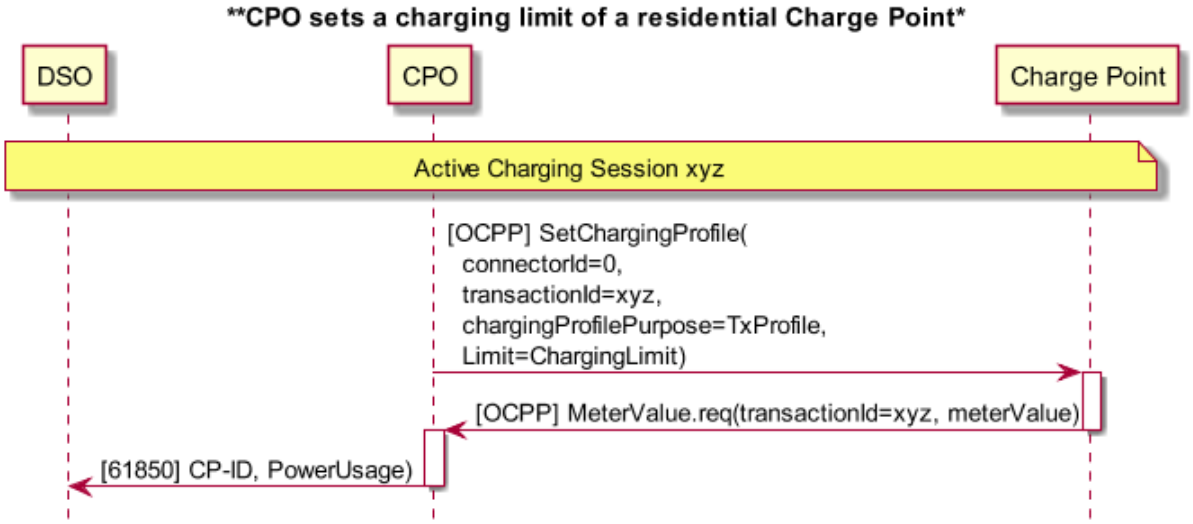
3.7. CPO Sets charging limit

This use case describes how the CPO set a charging limit on a transaction or charge point and what events are send to the various systems.

3.7.1. Public Charge Point



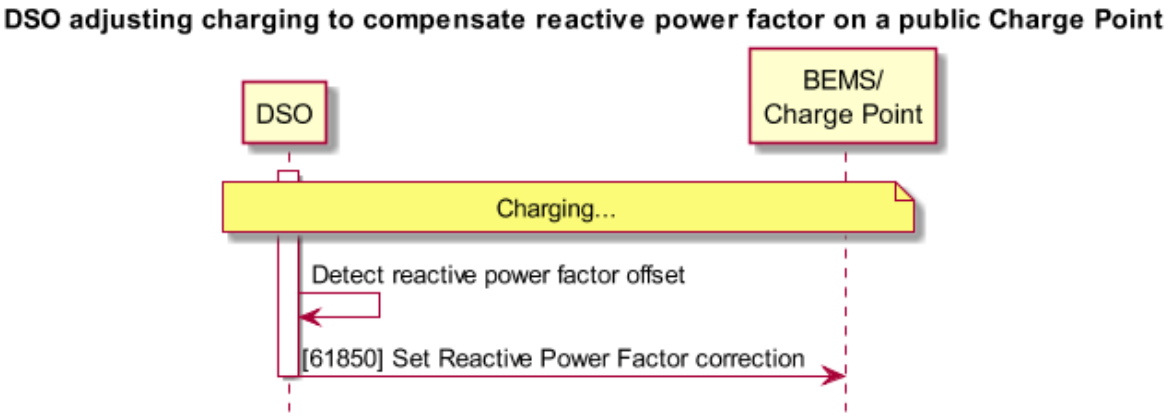
3.7.2. Residential Charge Point



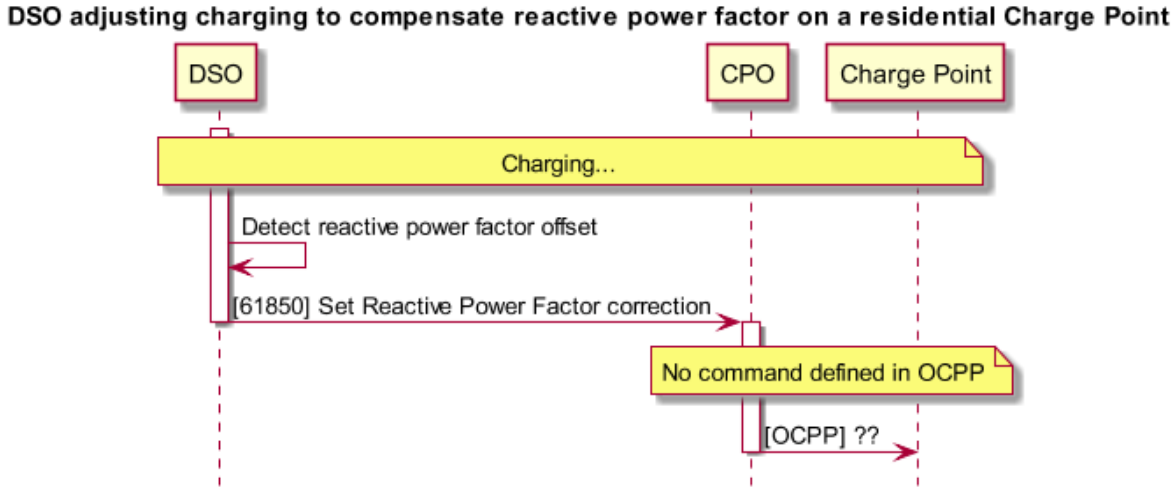
3.8. Reactive Power Factor

A Charge Point can (theoretically) compensate Reactive Power Factor offsets. This can enable DSO to compensate when the Reactive Power Factor is to fare of the target.

3.8.1. Public Charge Point



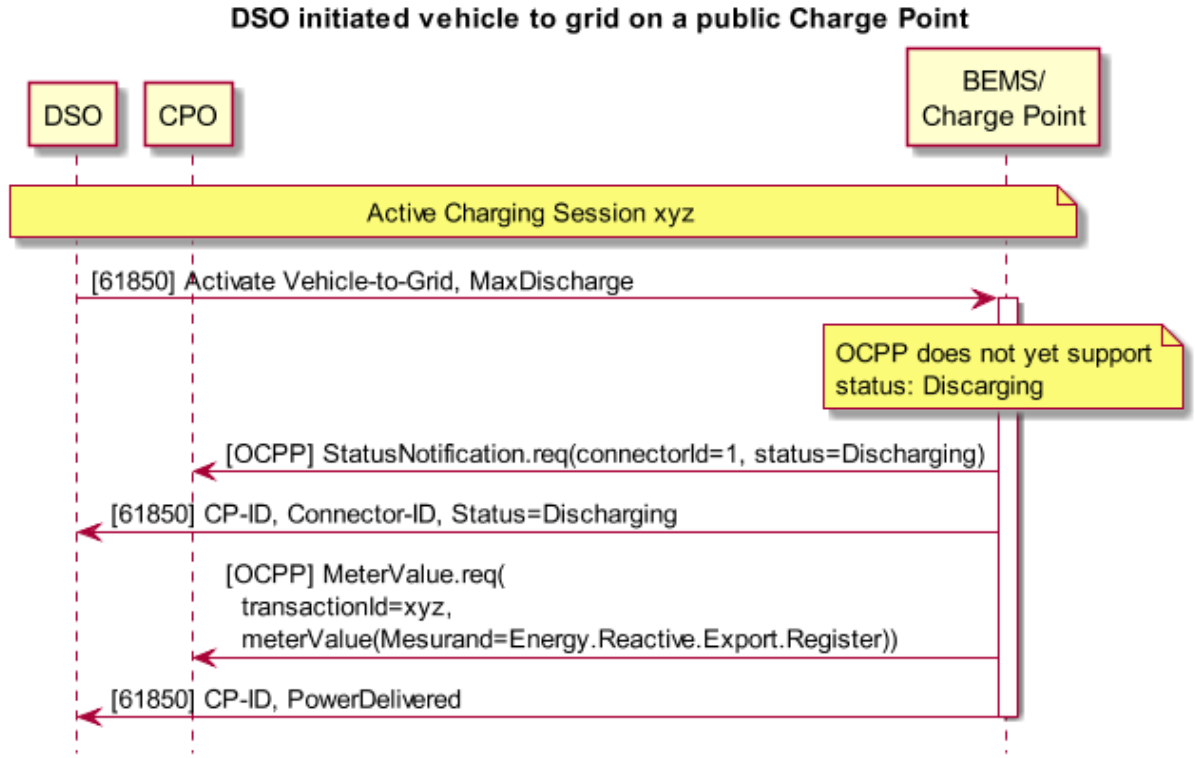
3.8.2. Residential Charge Point

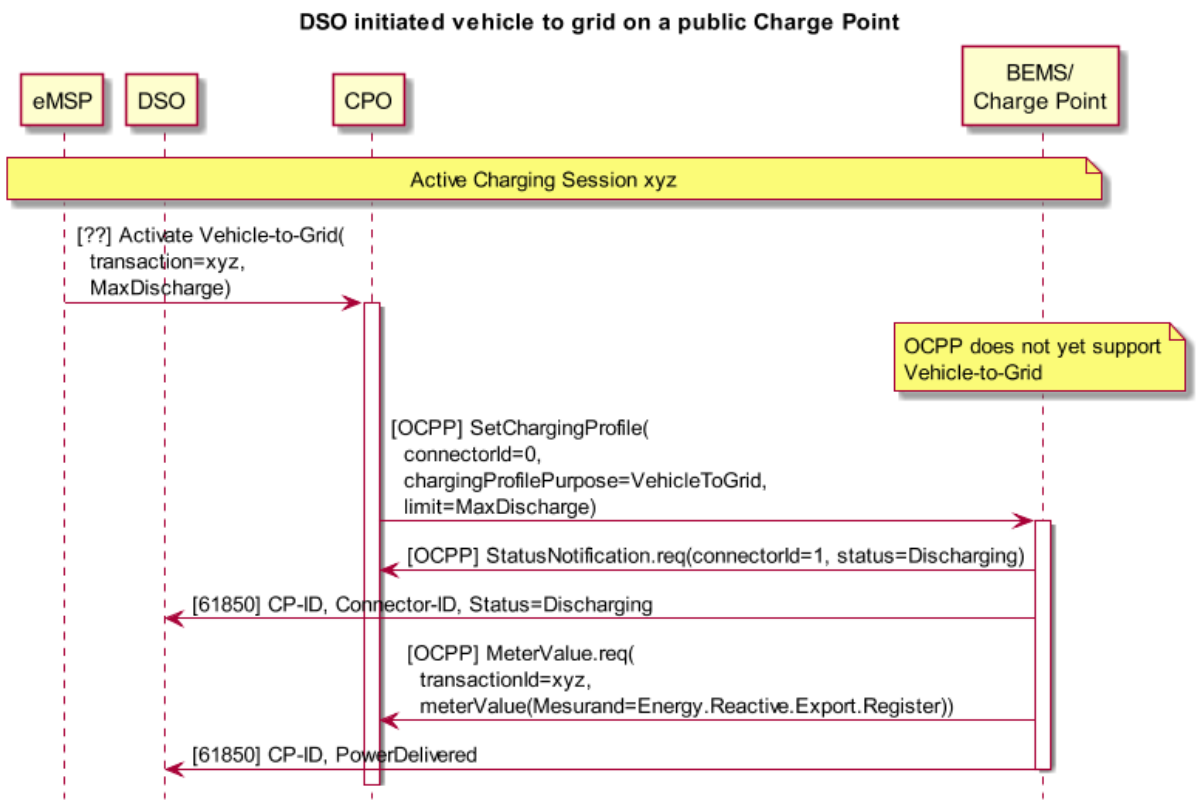


3.9. Vehicle to Grid

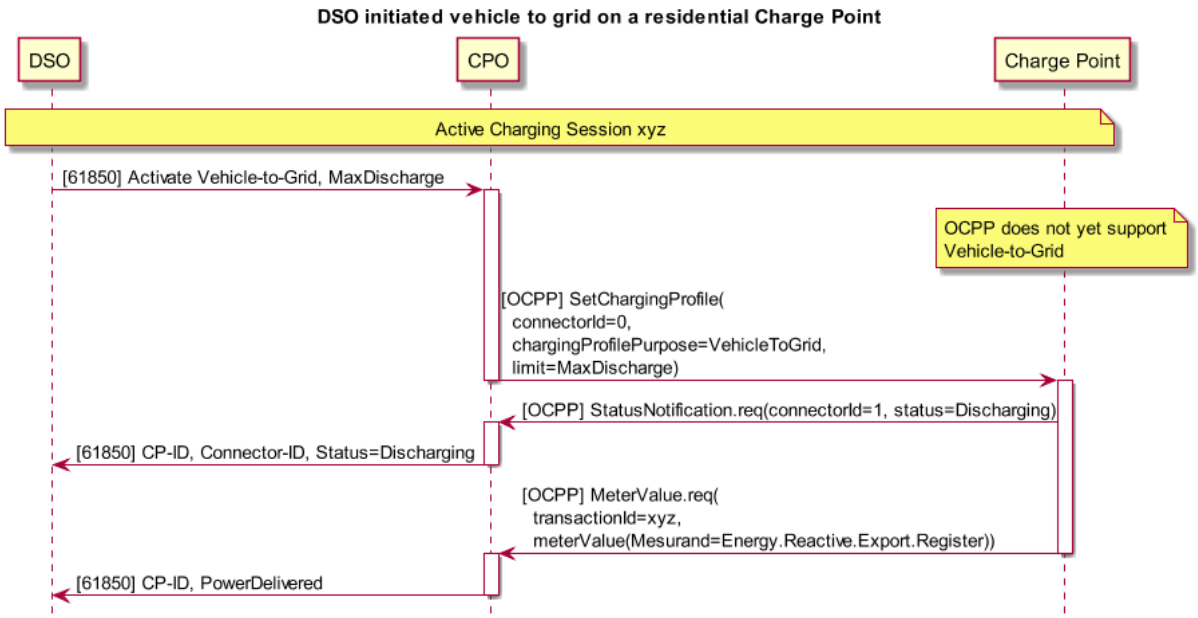
This use case describes how a vehicle to grid discharge would work. How it is started, and what events/updates are send to the various systems.

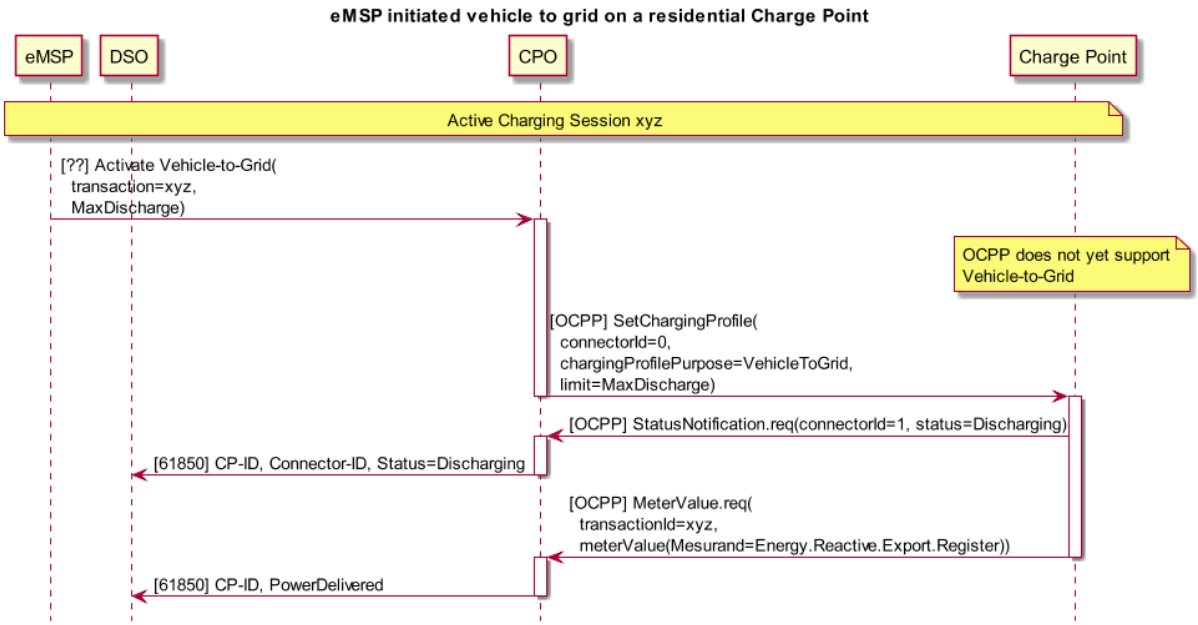
3.9.1. Public Charge Point





3.9.2. Residential Charge Point

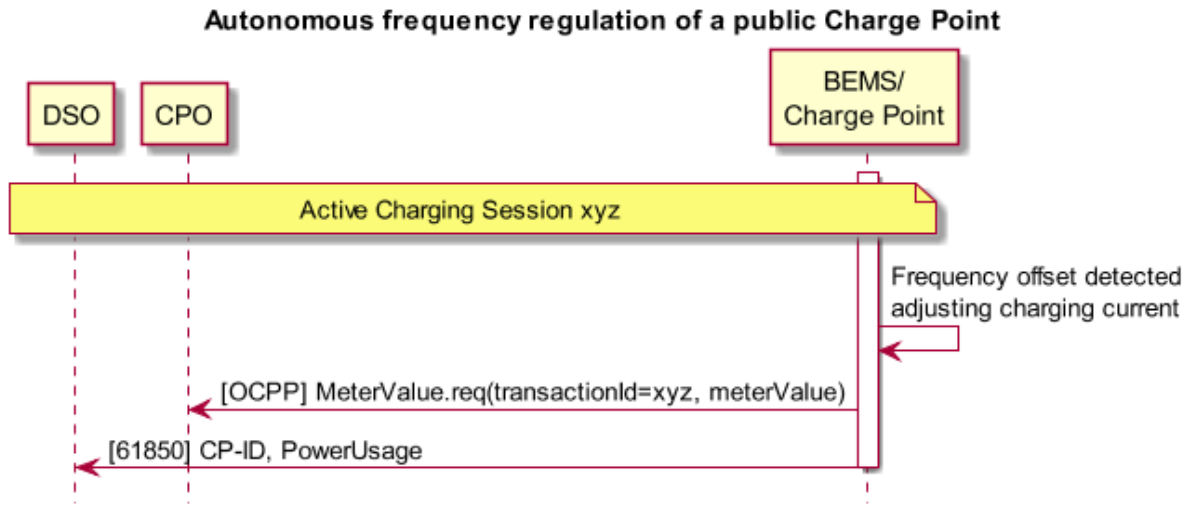




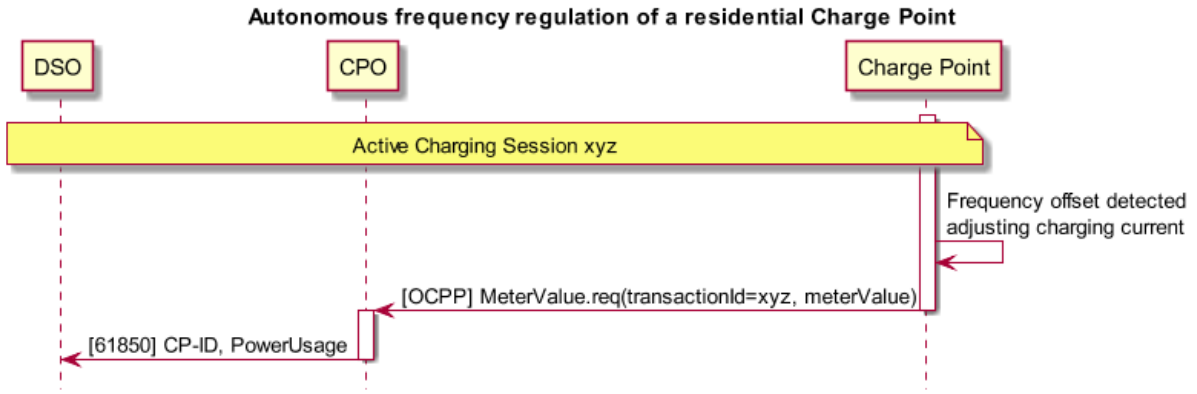
3.10.Autonomous Frequency Control/Regulation

If a Charge Point has an autonomous frequency control function, it can detect variations in the AC frequency of the grid and adjust to load on the grid, to help compensate for grid off-balance that can cause a frequency offset.

3.10.1.Public Charge Point



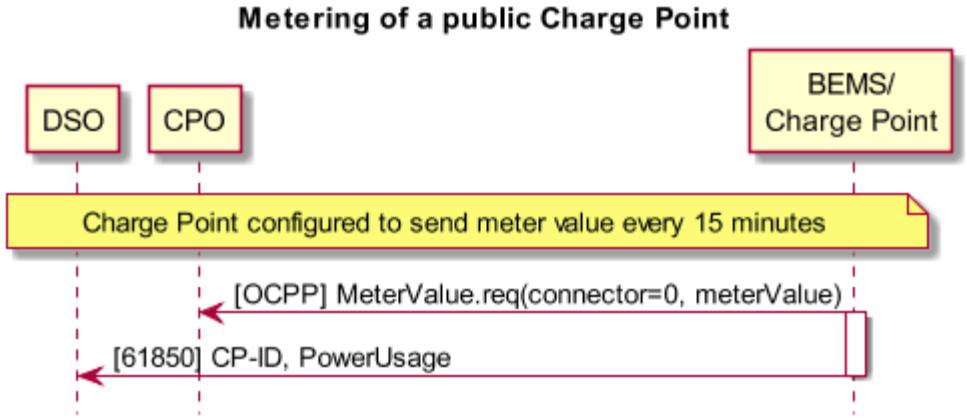
3.10.2.Residential Charge Point



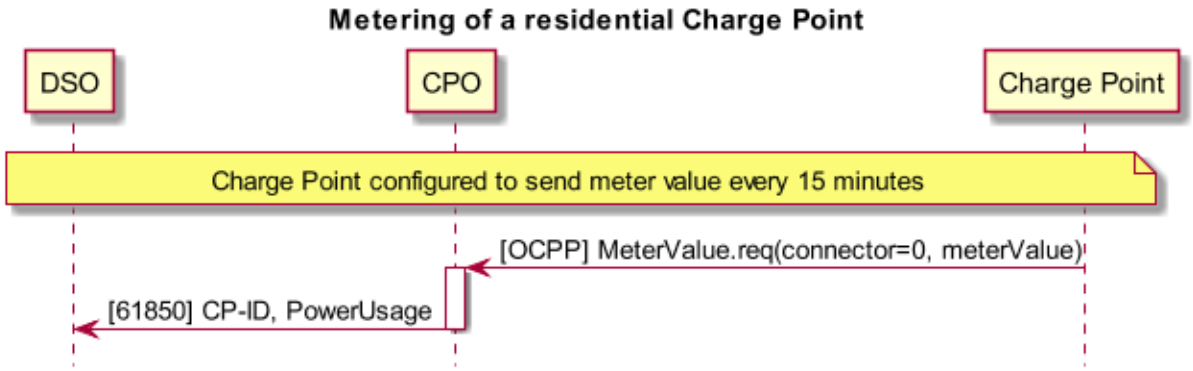
3.11.Metering

This use case describes how a meter value can be requested by the DSO.

3.11.1.Public Charge Point



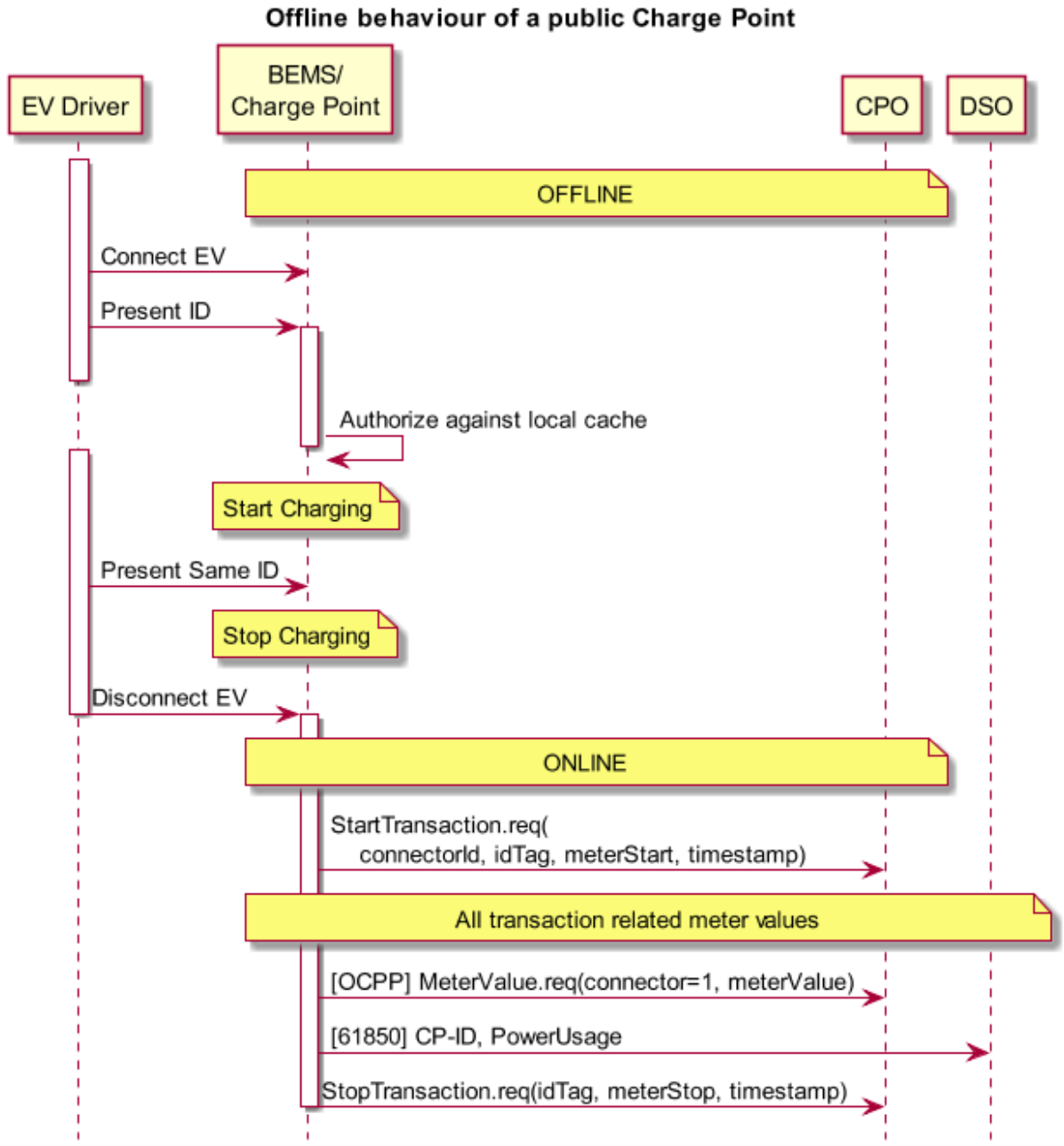
3.11.2.Residential Charge Point



3.12.Offline Transaction

This use case describes the offline transaction case, how a Charge Point works offline and what events/updates are send to the various system after the Charge Point comes back online.

3.12.1.Public Charge Point



3.12.2.Residential Charge Point