

BCIT NRCan EVID Project Workshop Session 5: Roaming

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Agenda:

- What is Roaming?
- Why is it Important to EV Drivers?
- How Does it Work?
- OCPI
- Our Implementation
- Q&A



What is EV Roaming?

- Similar to cell phone roaming.
- Drivers can have accounts with various providers.
- Roaming allows drivers to charge with EVSE (Electric Vehicle Supply Equipment) providers other than their main provider.



Why is it Important to EV Drivers?

- Many EVSE providers.
- With Roaming, you have one account that allows you access all EV chargers with Providers have enabled Roaming.
- No need to remember multiple balances.
- Convenience.



How Does it Work?

- EVSE providers share information about EVSEs, customer, and charging sessions.
- Roaming customers can then be approved, charge their vehicle, and billed.
- The customer's provider then charges their customer and passes the money on to the provider that provided the charge.
- There may be Roaming fees.



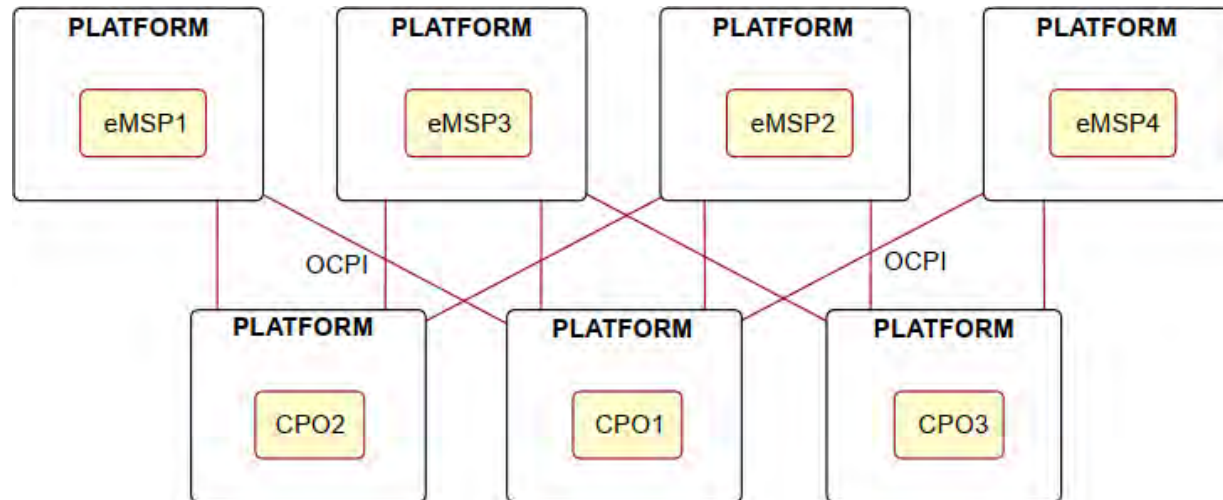
OCPI

- Open Charge Point Interface, latest version 2.2.1
- <https://evroaming.org/>
- Scalable, automated EV roaming setup between Charge Point Operators (CPOs) and eMobility Service Providers (eMSPs).
- Offers an attractive and scalable solution for roaming between EV networks.
- Helps enable EV drivers to charge everywhere in a fully-informed way.

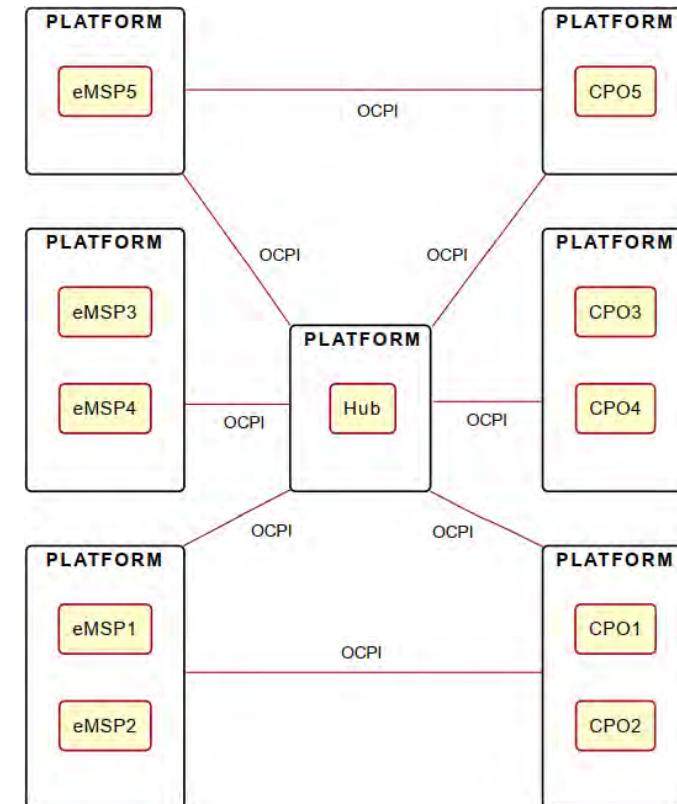


OCPI Topologies

Multiple Peer-to-Peer



Platforms via Hub and Direct



The distinction between objects from different CPOs/eMSPs is made based on a {country_code} (ISO-3166 alpha-2 country code) and {party_id} (ISO-15118 standard).

OCPI Implementation

- OCPI is a communication standard.
- Based on HTTP, uses JSON format, following RESTful architecture.
- Pull: Receiver request a list of objects every so often.
- Push: Changes in objects sent as required to the receiver.
- Request methods: GET, POST, PUT, PATCH, DELETE.
- Status Codes:
 - 1xxx: Success
 - 2xxx: Client errors
 - 3xxx: Server errors
 - 4xxx: Hub errors



OCPI Modules

Versions	Clients learn which versions of OCPI a server supports, and which modules it supports for each of the versions.
Credentials	Exchange the credentials token that has to be used by parties for authorization of requests.
Locations	Describe the charging locations of an operator. Includes address info, EVSEs, hours of operation, and even nearby facilities such as shopping, dining, or even wifi availability.
Tariffs	The Tariffs module gives eMSPs information about the tariffs used by the CPO. Incredibly complicated data structure to handle all but the most ridiculous of tariffs. Will be revamped in OCPI 3.0 to be a bit more friendly for simpler tariffs.
Tokens	Gives CPOs knowledge of the token information of an eMSP. Tokens cannot be deleted, they can only become invalidated. A Token is a customer reference, usually an RFID value.
Sessions	Describes one charging session. Includes multiple ChargingPeriods.
CDRs	A Charge Detail Record is the description of a concluded charging session. The CDR is the only billing-relevant object. CDRs are created by the CPO. They most likely will be sent only to the eMSP that needs to pay the bill of the underlying charging session. Because a CDR is for billing purposes, it cannot be changed or replaced once sent to the eMSP. Changes are simply not allowed. Instead, a CreditCDR can be sent. The CDR object shall always contain information like Location, EVSE, Tariffs and Token as they were at the start of the charging session.
Commands	Enables remote commands to be sent to a Location/EVSE. StartSession, StopSession, ReserveNow, CancelReservation, UnlockConnector

UUIDs (Universally Unique Identifier, aka Globally Unique ID) are used for uniquely identifying things, along with PartyID and CountryCode.

Our Implementation

- The Electric Vehicle Infrastructure Demonstration (EVID) project was started in 2017.
- Implementing various versions of Open Charge Point Protocol (OCPP) [1.5, 1.6S, 1.6J, 2.0].
- Added OCPI (v2.2) tables to co-exist concurrently in the same database.
- Will be available at <http://files.mgrid-bcit.ca/download/>.



Roaming Testing with OCPI

- Created two implementations to use accounts from one to charge at the other.
- We used an account at Carbon Plunk (Sun Country Highways) to successfully start a charging session at BCIT's OASIS facilities.
- We were successfully able to transfer Locations, Tariffs, and Tokens; send start/stop Commands; create charging Sessions; and deliver a final CDR once the charge was complete.

EVSE	Connector	Start Time	Duration	kWh	Cost
OASIS L2:9	J1772	22-02-01 06:33:13	03:56:15	19.6	\$4.03
OASIS L2:9	J1772	22-01-31 06:28:12	03:59:43	21.8	\$4.03
OASIS L2:9	J1772	22-01-28 06:24:26	04:20:01	19.8	\$5.04
OASIS L2:9	J1772	22-01-27 06:39:23	04:10:50	20.8	\$4.28
OASIS L2:9	J1772	22-01-26 06:44:45	03:59:06	20.4	\$4.03
OASIS L2:9	J1772	22-01-25 06:24:22	04:01:41	18.3	\$4.28
OASIS L2:9	J1772	22-01-24 06:21:16	03:59:48	22.7	\$4.28

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Q&A on Roaming

