



# Layers of interoperability

Presentation LATAM training session  
On interoperability for EV charging  
and a practical application in Latin-America

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# Introduction

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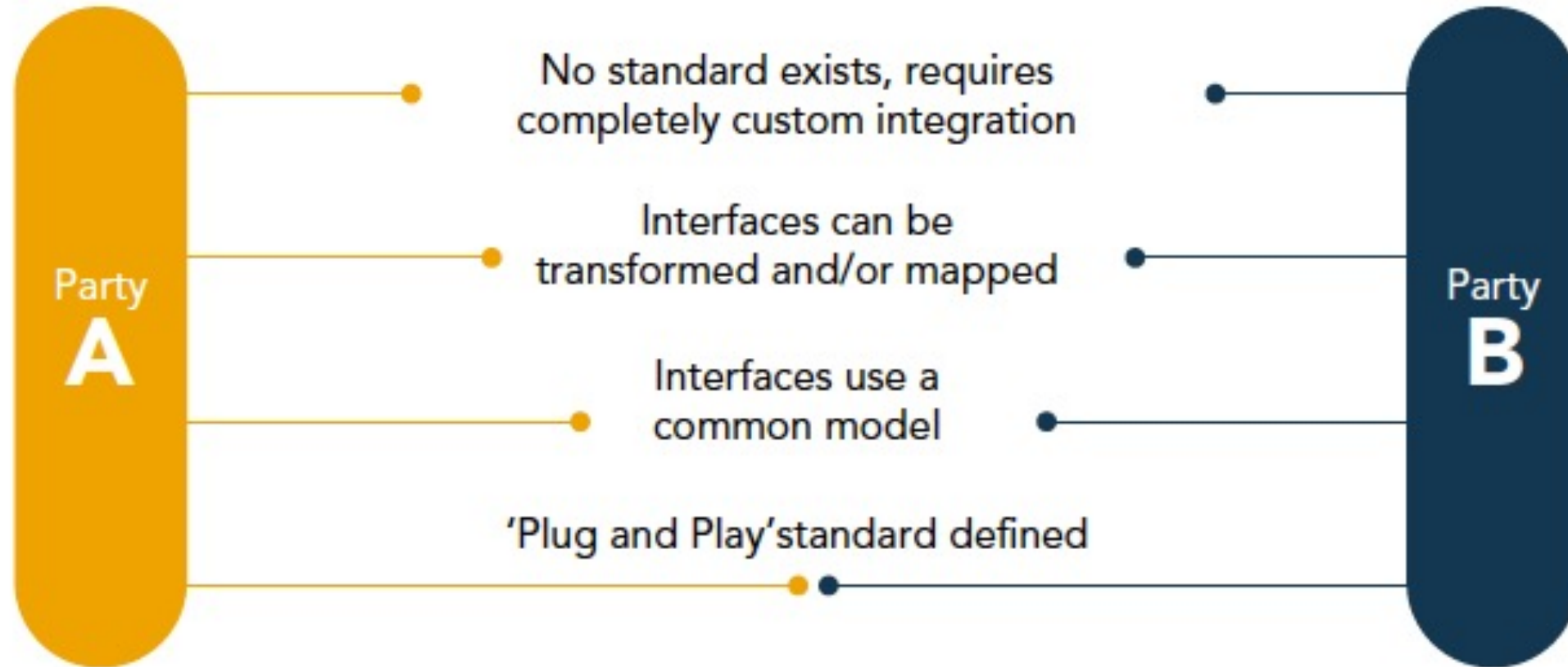
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- Steering Committee - National Charging Agenda
- Founder and Board member – EVRoaming Foundation (OCPI)
- Independent consultant in growing countries

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# Layers of interoperability



# Advantages of interoperability

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No conversion/translation



Reduction of installation and integration costs

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Reuse of components



Efficient scale-up of services

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Limited dependencies on third parties



Efficient development of new services

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No technology 'lock-in'



Better competitive environment

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A more equal playing field

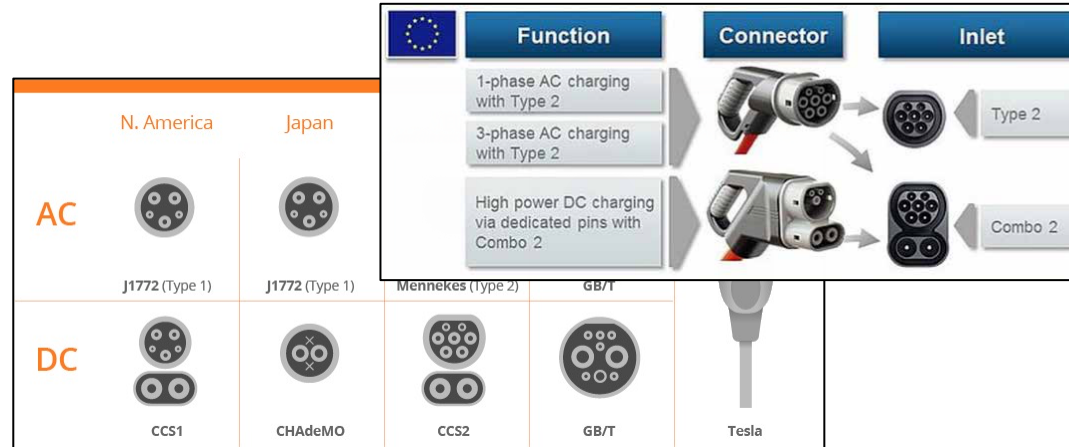


A shift towards price, transparency and reliability

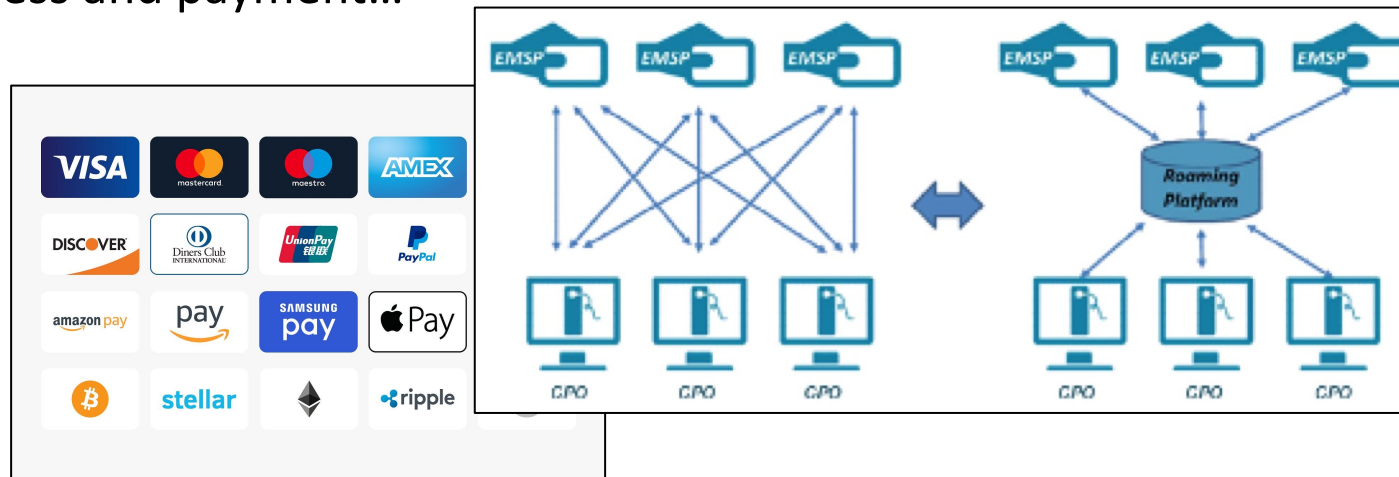
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# What is interoperability for EV charging ?

Connectors and plugs...

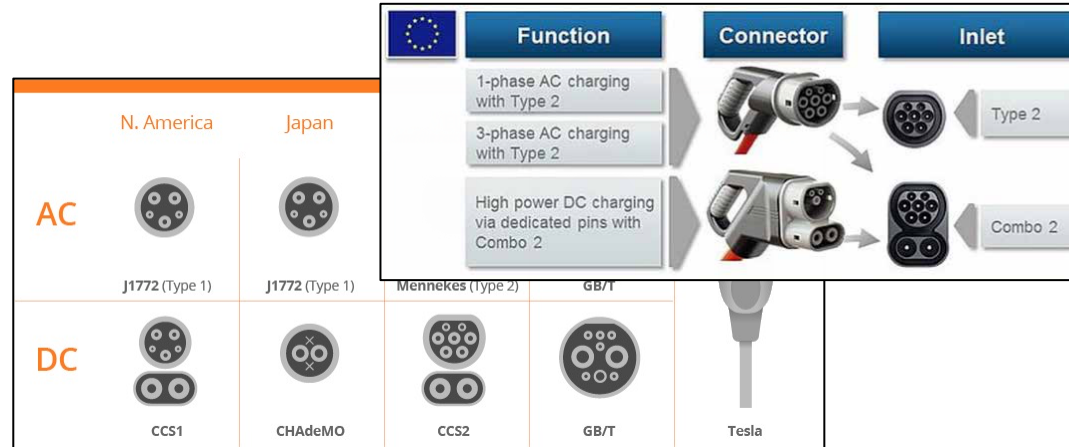


Access and payment...

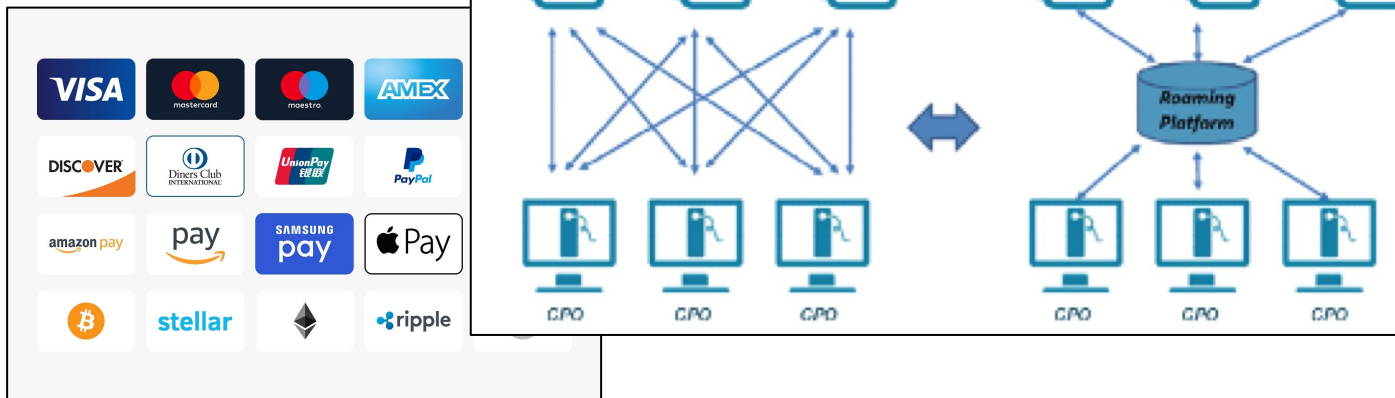


# What is interoperability for EV charging ?

## Connectors and plugs...



## Access and payment...



**Business layer**  
(Market and government)

The market configuration, policy and regulatory framework.



**Service layer**  
(EV Roaming)

EV charging services, functions, and their relationships are described in use cases.



**Information layer**

Information objects, underlying data models and protocols that are being used for information exchange



**Communications layer**

Connections between hardware and software systems, via ethernet, wireless or via charging cable

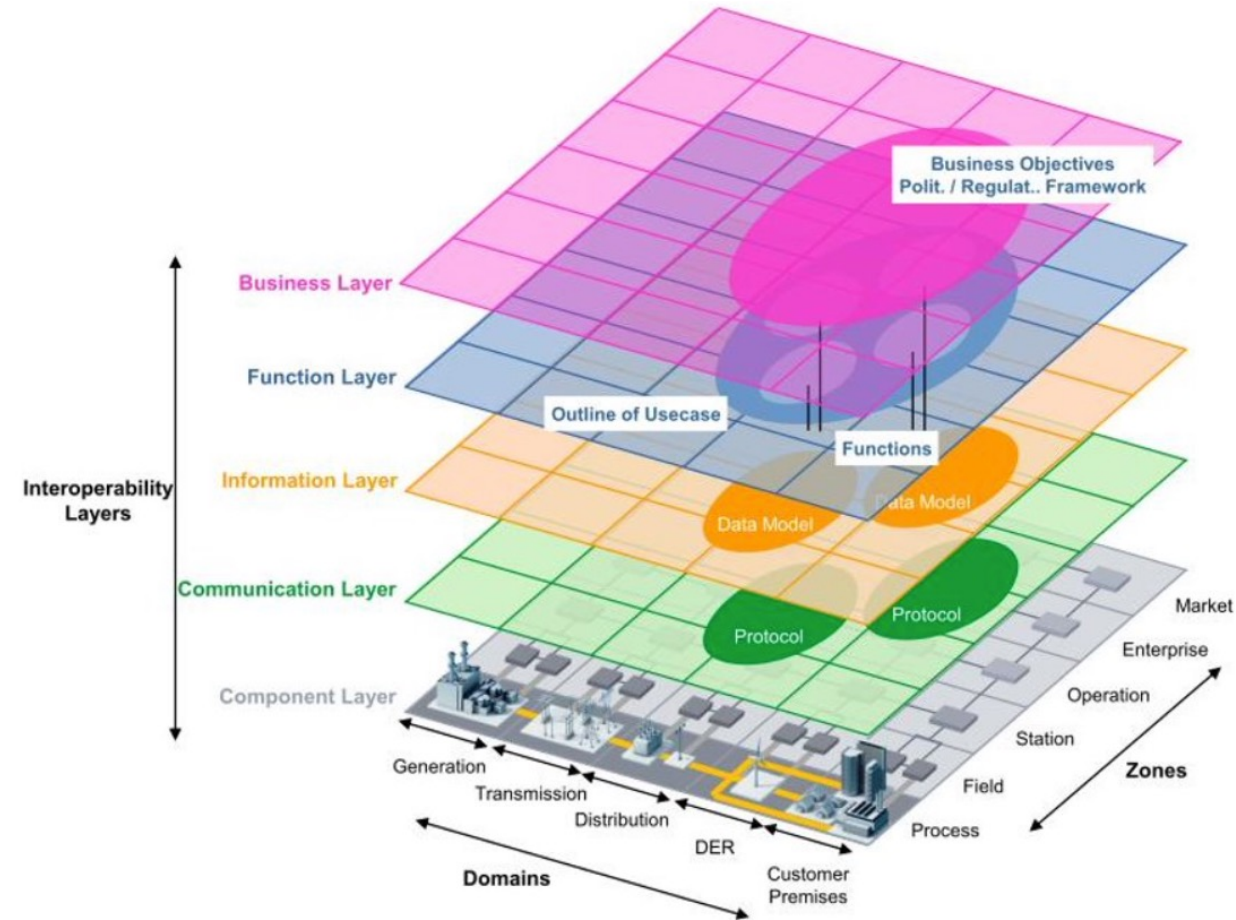


**Hardware layer**

Hardware of the ecosystem

# Future ecosystem

## Future-proof and interoperable



Layers of interoperability:

1. Standardized connectors, plugs, and other **hardware** elements
2. **Connections** between components
3. Uniform **data model** and **protocols** for meaningful information exchange
4. Standardized **user services** and use cases across the sector: navigation, charging, payment, metering,
5. A regulatory and business **framework** for collaboration, contracting and exchange of information

*Conform the Smart Grid Architecture Model (SGAM)*

# INTEROPERABILITY FOR ELECTRIC VEHICLE CHARGING

IN LATIN AMERICA AND THE CARIBBEAN

PRACTICAL GUIDE OF RECOMMENDATIONS



## Practical application: How to develop interoperability in Latin-America?

Organized by the United Nations Environment Programme (UNEP)

In collaboration with MOVE and with OLADE, with support from Euroclima+

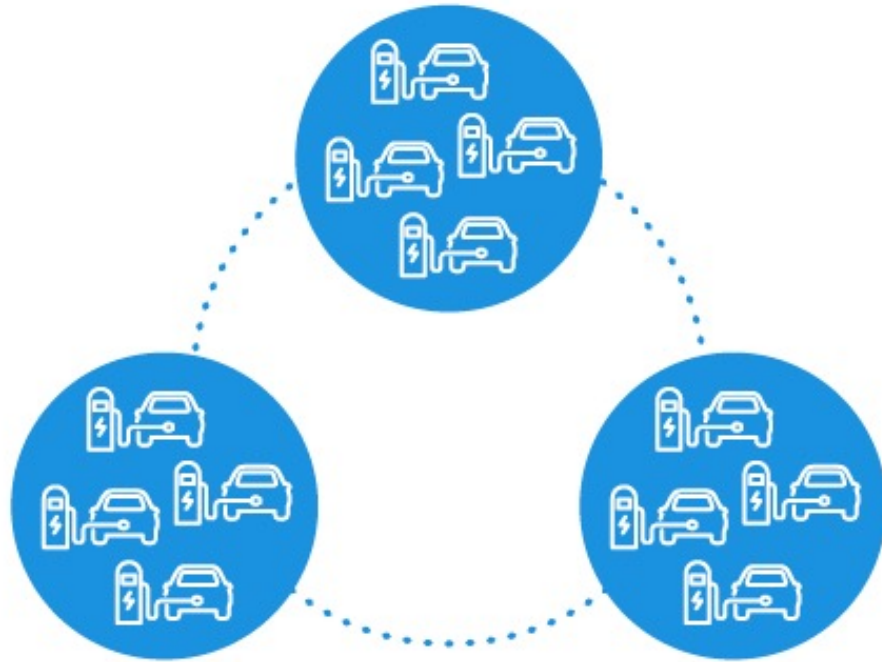
- Identify EV charging and energy market configuration
- Layers of interoperability characteristics
- Minimum and optimal requirements
- Recommendations and next steps



# EV charging in Latin-America: Energy market topologies

Country	National & Vertical	Sub-National & Closed	Open Market
Argentina			
Chile			
Colombia			
Costa Rica			
Dominican Republic			
Ecuador			
El Salvador			
Guatemala			
Honduras			
Mexico			
Nicaragua			
Panama			
Paraguay <sup>19</sup>			
Uruguay			

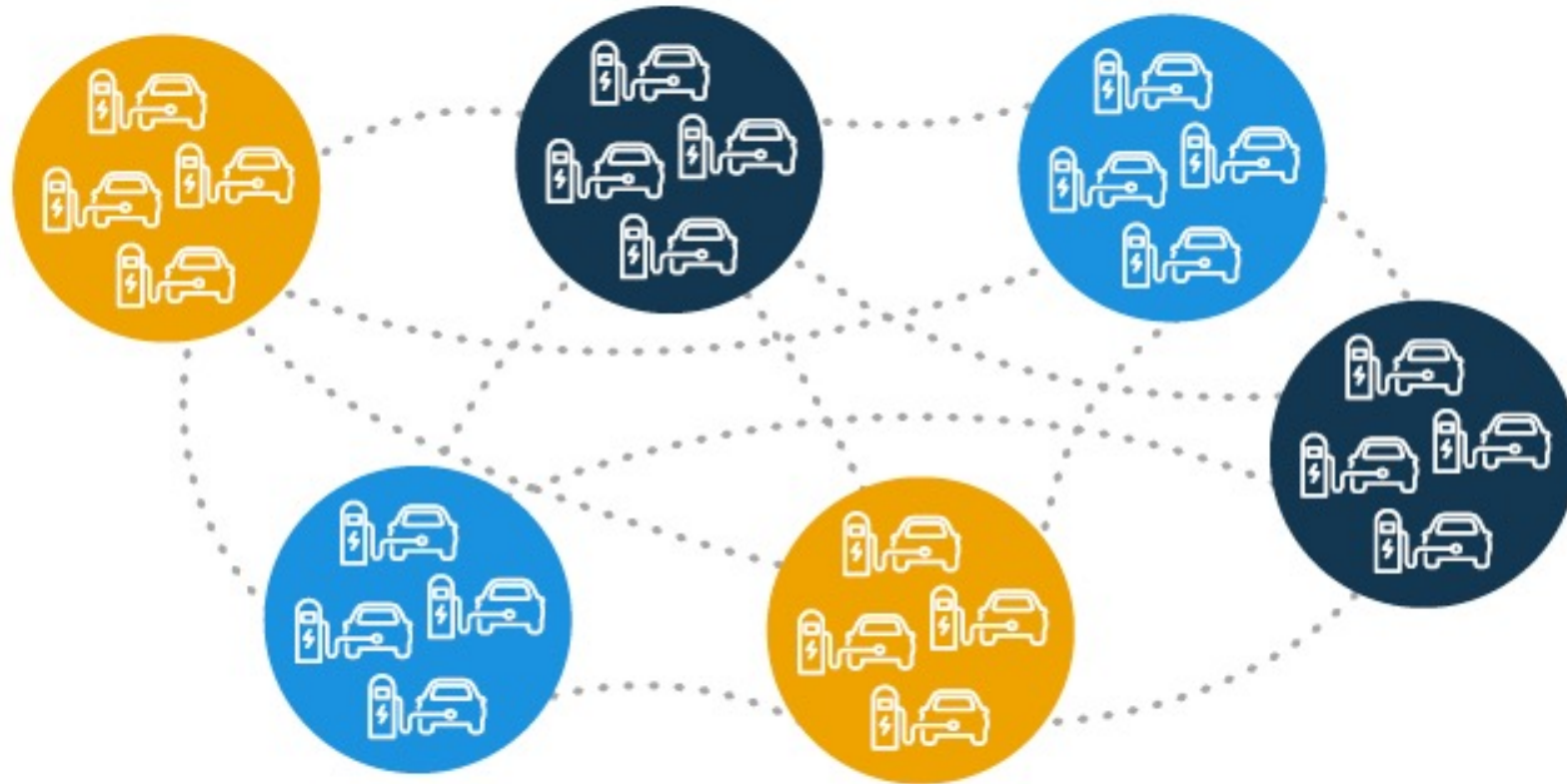
# Charging in a closed energy market configuration



# Charging in a semi-open energy market configuration



# Charging in an open energy market configuration



# Future ecosystem interoperability recommendations

<b>Business Framework</b>	Develop a regulatory framework: <ul style="list-style-type: none"><li>• in line with climate strategy, energy strategy, mobility strategy</li><li>• user centric, standardized business &amp; contracting processes</li></ul>
<b>Services</b>	Define (1) user-centric and (2) business-centric services, in line with eMobility strategy and business framework Standardize payment, roaming, navigation services, pricing Develop a register of charging station information, a register of market players
<b>Communication</b>	Choose protocols that are independent of a market design. For information, transactions, data management OCPP, OCPI, ISO15118 (and ISO standards when available)
<b>Connections</b>	Connected charging stations are required. Follow industry standards of manufacturers
<b>Hardware</b>	Standardize a.s.a.p. on connectors. Distinguish between passenger/light duty, buses, heavy duty vehicles Check interoperability/uniformity for related components



# Summarizing...

- Interoperability is a well-established property of mature ecosystems in adjacent sectors
- There is a strong relationship between the energy market configuration and the market design of EV charging services
- The starting point for developing an EV charging market is therefore different per country
- The layers of interoperability support an integral approach towards interoperability, and are useful to address specific measures and interventions for a specific situation





# EVRoaming Foundation

Realising cross-border charging

The management organization for the open roaming protocol OCPI

Board members: Freshmile, Chargepoint, Google, Last Mile Solutions, EVBOX, Gireve, NKL

Contributors are welcome to join => [www.evroaming.org](http://www.evroaming.org)

- ✓ Open, free-to-use, community driven
- ✓ Connecting charge point operators, service providers, aggregators, platforms
- ✓ In order for EV drivers to charge at every charging station
- ✓ For any interoperable charging data transaction





# Thank you !



**EVRoaming Foundation**  
Realising cross-border charging

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