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Interoperability of electric vehicle charging infrastructure

Arnaud Mora¹

¹*Freshmile, Aéroport Strasbourg, Bâtiment Blériot, 67960 France, web@freshmile.com*

Summary

Interoperability of electric vehicle charging infrastructure is a major enabler of mass transition to electric mobility. Interoperability, also known as roaming, allows EV drivers to use any charging point in any place with the use of a single means or a limited set of means, such as a RFID card, a mobile application or any onboard system. The paper highlights the stakes behind interoperability, in line with the corresponding EU directive and explores the consequences for end-users, public bodies and private service providers.

Keywords: electric vehicle, charging infrastructure, roaming, interoperability

1 Use of charging stations

Today, electric vehicle drivers may charge at various locations, such as at home, at work, in city streets, car parks, shopping centres, restaurants and on motorways. If charging standards have converged from an electrical point of view, starting and paying for charging services may differ by a great deal.

EU directive 2014/94 (alternative fuel infrastructure) states that access to charging infrastructure must be simple. Both the EU directive and French rules require charging point operators to grant access to public charging stations without requesting users to enroll for a service beforehand. These rules are still poorly observed by many charging point operators and lead to frustration and useless complexity for end-users.

Public charging infrastructure and private charging infrastructure such as found at home and at the workplace naturally differ. However, the growing role played by car manufacturers as electric mobility service providers require a unified approach to access rights management and payment.

2 Roaming perspectives

The concept behind interoperability is similar to roaming in mobile telephony: with a single device and a single contract, a end-user may use third-party telecom networks, different from his or her home network. Thanks to roaming, it is possible for a French consumer to send a text message from Germany to Spain without being even aware of the technological and contractual complexity behind this mundane task.

In electric mobility, the roaming topic is not yet solved and EV drivers routinely have several accounts with several providers in order to be able to charge in as many locations as possible.

From a technological point of view, there are two main paradigms: centralized interoperability versus decentralized interoperability. Centralized interoperability rely on a central database of charging points and user IDs, whereas decentralized roaming rely on bilateral exchange of messages between operators. Centralized roaming is championed by platforms such as Hubeject in Germany and Gireve in France, whereas decentralized roaming rather rely on proprietary or open-source protocols, such as OCPI.

From a contractual point of view, both approaches are similar, as operators have to enter bilateral agreements and support counterparty risk. There is not yet anything such as a clearing chamber, as can be found in more mature industries, such as financial services.

3 Charging behaviours

Charging electric vehicles is by construction more complex than refuelling and takes more time. For these reasons, managing the flow of users at charging stations is of utmost importance in order to avoid queues or charging points being pointlessly busy.

Informing users in real-time and influencing their behaviour through pricing is the only way to manage this issue. Various strategies are possible. Tariffs greatly differ according to charging stations' location, use rate, available charging power, nearby traffic, parking policies, etc.

In this regard, interoperability is also of importance, as users with different contracts may be granted similar incentives, or not.

4 Trends

4.1 Trend n°1: car manufacturers as service providers

The car industry is embracing the service economy. Besides obvious topics such as car sharing and car pooling, the mass transition to electric mobility is also an opportunity to add services. Hence car manufacturers increasingly offer electric mobility services. As they control real-time interaction with drivers through onboard devices, charging point operators are expected to work more closely with car manufacturers.

4.2 Trend n°2: industry vertical integration

Historically, charging equipment and charging services were mostly separate. Charging equipment is best manufactured by established electric equipment manufacturers whereas services are best developed by smaller creative technology and software companies. As in telephony, smooth user experience require hardware and software specialists to work together. Here too, charging point operators are expected to work more closely with charging equipment manufacturers.

4.3 Trend n°3: industry consolidation and software-as-a-service

The electric vehicle charging industry will follow the path of telecoms. As a mass-market, economies of scale and technical efficiency will be reached by industry consolidation, leading to 3 to 5 main players on each domestic market and perhaps as few as 10 pan-European players in the medium term. The main difference with telecoms being that charging infrastructure is not necessarily owned by operators, the industry may also grow a software-as-a-service business model, whereas local infrastructure owners buy services on the cloud from a handful of providers.

Authors



Arnaud Mora, a French citizen, is the CEO and founder of Freshmile, a charging service operator for electric vehicles. Freshmile is a pioneer of EV charging in France and opened its capital in 2016 to the Caisse des Dépôts, France's largest institutional investor. Before creating Freshmile, Arnaud Mora worked in corporate & investment banking at Société Générale in London and in Vienna. In 2006, he left banking to set up in London a consultancy specialized in advisory and project finance for the renewable energy and environmental industry. Convergence between energy and mobility leads him to launch Freshmile in 2010.

Arnaud Mora graduated from the Institut d'Etudes Politiques de Paris in 1999 (Economics and Finance). He also graduated as a sound engineer from the Conservatoire National Supérieur de Musique in Paris.