



Nathan Dunlop  
Head of Market Strategy

May 2020

**New Plug and Charge technology will improve the EV driver experience and provide an innovation platform for operators to build upon**



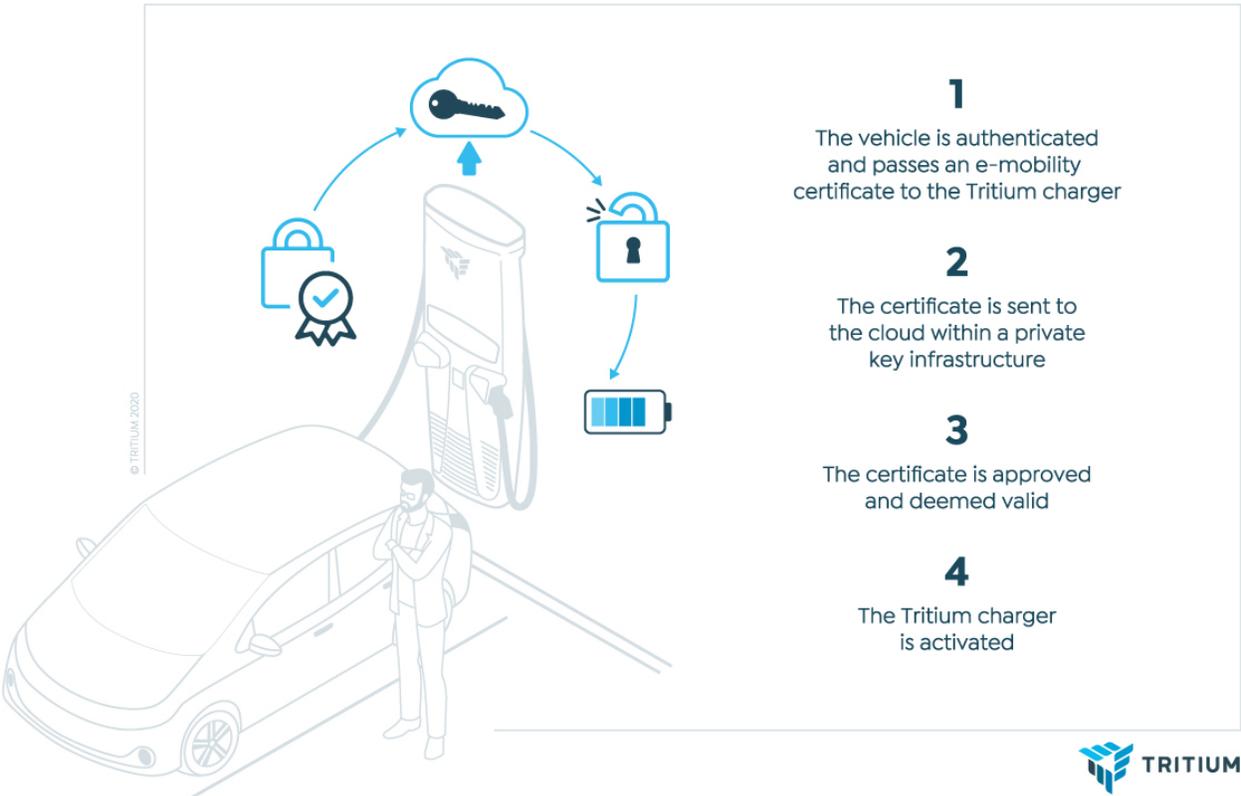
## INTRODUCTION

Electric vehicle (EV) drivers currently pay for their public charging in a range of ways, some via an RFID membership card, smartphone application, or via a credit card reader. Roaming providers have made membership programs more user friendly, where one RFID membership card can be used across charging network or country borders. However, due to new charging technology first available from Tritium, drivers will be able to plug in, receive a charge, and provide payment all via the charging cable. This technology is called Plug and Charge. Plug and Charge will improve the driver experience, providing seamless payment for drivers to initiate their charging session. The technology is also a platform that can be built upon by operators to offer new innovative products and services that will make the switch to e-mobility even more compelling.

# PLUG AND CHARGE TECHNOLOGY OVERVIEW

Plug and Charge is built on the ISO 15118 standard. The standard is a communications protocol that enables the electric vehicle and charging equipment to authenticate, authorise, and bill customers via the charging cable. This communication via the charging plug and cable, eliminates both the need for a physical RFID card or authentication via a smartphone app. Plug and Charge will simply let the customer plug in the car, receive a charge, and drive away knowing that payment has been effortlessly managed via a set of digital certificates that contain pre-approved payment configurations.

A high-level overview of the customer interaction is laid out below. In step 1 the car is plugged into the charging station where the vehicle certificate is sent from; this certificate is received in step 2 by a cloud-based authentication authority; in step 3 the validity of the certificate is approved and sent back to the charging station; where in step 4 the charging station is initiated. This plug and charge process and technology enables the customer to receive a seamless low-effort charging experience.



# IMPROVED DRIVER EXPERIENCE USING PLUG AND CHARGE

Plug and Charge simplifies the charging experience for customers by both streamlining and simplifying their interactions with the charging equipment. This reduces the need for a driver to carry a physical identifier and will improve the security of driver information.



## ELIMINATES RFID

---



## IMPROVED SECURITY

---

### 1. *Removes the need to carry a physical membership card, eliminating RFID*

Identification and authorisation by the vehicle will eliminate the need to carry RFID cards or require authentication via a smartphone to start a charging session. This will increase the speed to start a charging session and eliminates the customer pain point of not being able to conveniently start a charge if they have forgotten or misplaced their RFID card.

### 2. *Improves the security of customer data*

RFID cards as a customer identification method have previously encountered some security flaws. While these security issues have been addressed, there are vulnerabilities in using a physical identifier such as an RFID card, for example the potential for cloning. Moving to a certificate-based system, where an independent party provides certification, will result in a higher level of data security, and lower potential for theft of electricity from the charging equipment.

# PLUG AND CHARGE PROVIDES OPERATORS WITH AN INNOVATION PLATFORM TO BUILD UPON

Plug and Charge will enable stakeholders in the e-mobility ecosystem to innovate new offerings and re-define how the EV is used as a payment's mechanism. Platform strategies, or an "app store" effect, where innovators begin to layer on new services that benefit customers should be expected. Innovative value-added services will help the operator control the customer relationship or extend their relationship across industry boundaries. Three examples follow of how Plug and Charge can be a key enabler for these opportunities.



## IN VEHICLE CONTROL



## VEHICLE AS A SERVICE



## VEHICLE AS A CREDIT CARD

### 1. *Moving the charging interaction to an in-vehicle experience*

Plug and Charge sets a pathway for the customer to control the charging interaction from the driving seat, including setting charge speeds, and cost limit preferences. This experience could drive longer, more meaningful interactions in the vehicle, or in that provider's online ecosystem, such as a smartphone app. Secondly, this control would enable a car-branded experience on all types of charging infrastructure, such as the Tesla Supercharging Experience today. While a great experience for the customer, this charging experience would enable experience owners to manage the overall brand experience and reduce customer recognition of other e-mobility providers, effectively white labelling charging operators across the competitive landscape.

Similarly, vehicle charging could be managed via technology companies' in-car applications. Android Auto and Apple CarPlay are examples of technology companies going over the top of an existing industry to gain access to the customer relationship. Plug and Charge services could be an extension of these in-car experiences provided by these technology companies. Google recently incorporated charging station locations into Google Maps through integrations with charging operators. This service allows customers to locate chargers and check if they are occupied or out of service. By expanding these services to include charger bookings, charger advertising and further integrating charging into the in-car experience, the technology providers will provide access to the data flows and consumer behaviour tied to charging. These data flows may become a competitive advantage as they are used to either build new revenue streams or support their existing data-centric business models.

## 2. *Vehicle as a service, charging packages delivered via Plug and Charge*

If charger differentiation is limited due to the in-car experience being improved by Plug and Charge, the owner of this experience may gain strong bargaining power to negotiate cheaper or more compelling offerings that sit on top of the Plug and Charge technology. The experience owner could begin to send real-time pricing offers to drivers, offer bulk charging rates, charging subscriptions, or bundle charging services with vehicle purchases.

The first potential extension of this business model is a full "Vehicle as a Service" offering where car pricing and car loan financing includes the ongoing cost to run the vehicle. The second extension is where this network platform allows cross industry border offerings to be developed. A logical extension from vehicle charging is into the customer's other forms of energy use. With greater access to customers via Plug and Charge, experience owners may begin to compete for all forms of the customer's energy use. For example, Automakers could provide vehicle charging in public as well as their total energy use in the home, including home vehicle charging. Utilities may try to extend the home energy bill into paid public charging contracts where all the customer's energy use is centrally billed to the home account.

Whoever owns the charging experience may be able to use their driver base to develop innovative value propositions that start to blur the boundaries between automotive, technology and electricity businesses.

## 3. *Vehicle as a "credit card" or payments device*

If the vehicle has a validated payment mechanism via the charging cable, the vehicle effectively becomes a rolling payment medium. The use cases of the vehicle as a payment medium extend far further than solely charging services. For example, drive-through restaurant payment may become touch free, with limited human interaction. Ordering could be managed through in-vehicle applications or voice commands. Identification, authentication, and payment can then be centralised into a monthly vehicle spend. Whether the vehicle finance can be used as an account to procure goods and services via vehicle payment will need to be further investigated. However, this use case provides a further opportunity for the in-vehicle experience owner to attack revenues in adjacent industries, in this case the credit card and payments industry.



## **PLUG AND CHARGE ENABLED BY TRITIUM WILL BE AN INNOVATION CATALYST FOR NEW DRIVER EXPERIENCES**

Tritium fast chargers are the first to enable Plug and Charge communications between vehicle and charger via the charging cable. This communications mechanism has broader implications than solely making it easier for a driver to pay. Plug and Charge is an innovation opportunity for e-mobility operators looking to deploy new services that help them craft more compelling customer experiences, and therefore better capture and control the driver relationship.

*Paper amended from; Assessing customer experience improvements and resulting impacts of “Plug and Charge”, released at the 32nd Electric Vehicle Symposium (EVS32), Lyon, France, May 19 - 22, 2019. Full PDF available on request from [ndunlop@tritium.com.au](mailto:ndunlop@tritium.com.au)*