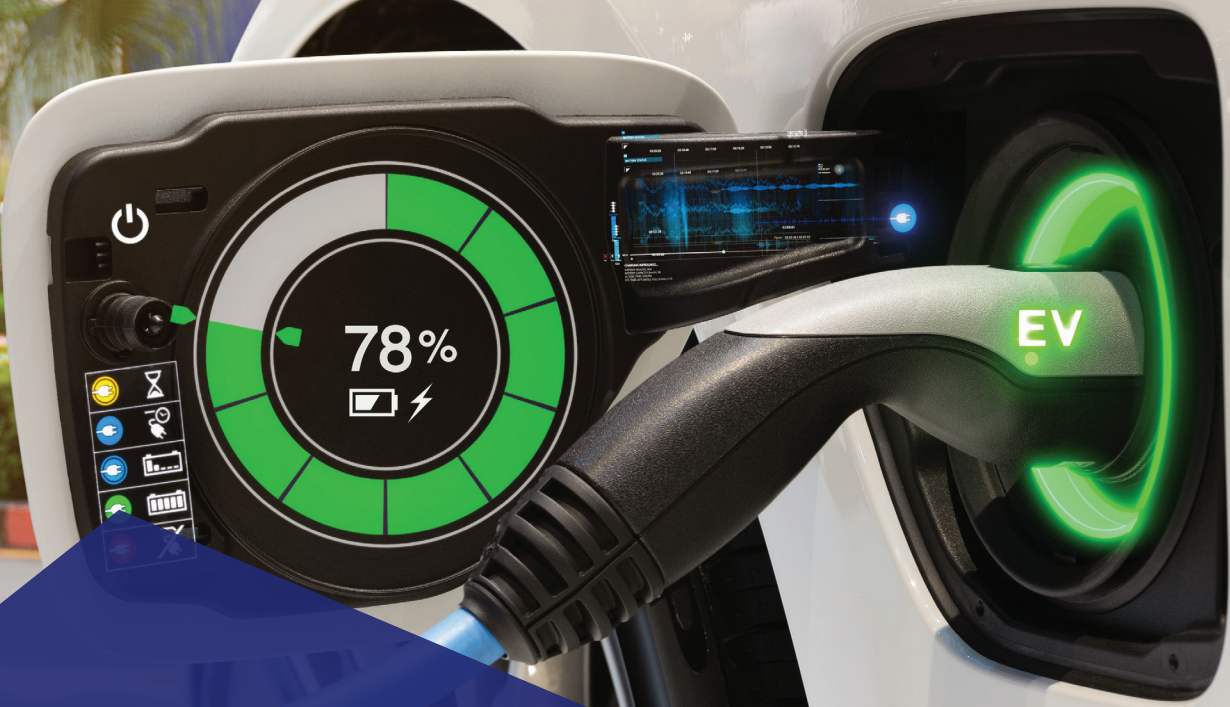




THALES

Building a future we can all trust



The image shows a close-up of a white electric vehicle (EV) being charged at a station. A black charging cable is plugged into the car's port, which is illuminated with a green glow. The charging station's digital display shows a green progress bar at 78% and a battery icon with a lightning bolt. The background is a blurred outdoor setting with palm trees and a building.

Thales simplifies and secures Electric Vehicle (EV) Charging

The EV market is booming but fragmented charging infrastructure is a potential roadblock to mass EV adoption. Thales has the solution.

Overcoming the challenges of charging infrastructure fragmentation

With climate change concerns and regulations, more and more Electric Vehicles (EVs) will replace Internal Combustion Engine (ICE) vehicles on the roads in the coming decades.

Motivated by EC regulation, forbidding ICE sales by 2035, analysts expect 145 million EVs on the road by 2030, with about 90 million in Europe alone. As almost all countries struggle to follow the path of the Paris Agreement in terms of greenhouse gas emissions, it is important to remove all potential roadblocks to massive EV adoption by customers. Beyond price and autonomy, EV charging has been identified as a critical pain point for end users' adoption.

Today, when traveling, not only does the EV owner have to find an available (and functional) charging station, but he/she also has to be able to pay for the transaction. And this is where the hassle starts. The

market has been flooded with a wide range of multiple solutions ranging from smartphone apps to classic RFID card payments linked to a variety of subscriptions.

To simplify the current ecosystem complexity, the next step is to enable the EV user to have a unique subscription from one electric Mobility Service Provider (eMSP) and receive an aggregated bill at the end of the month, encompassing all charging stations accessed. The parallel can be drawn with mobile phone communication where we all have one contract with a Mobile Network Operator (MNO) while being able to travel worldwide, use foreign mobile networks seamlessly, and still be billed by our home network operator.



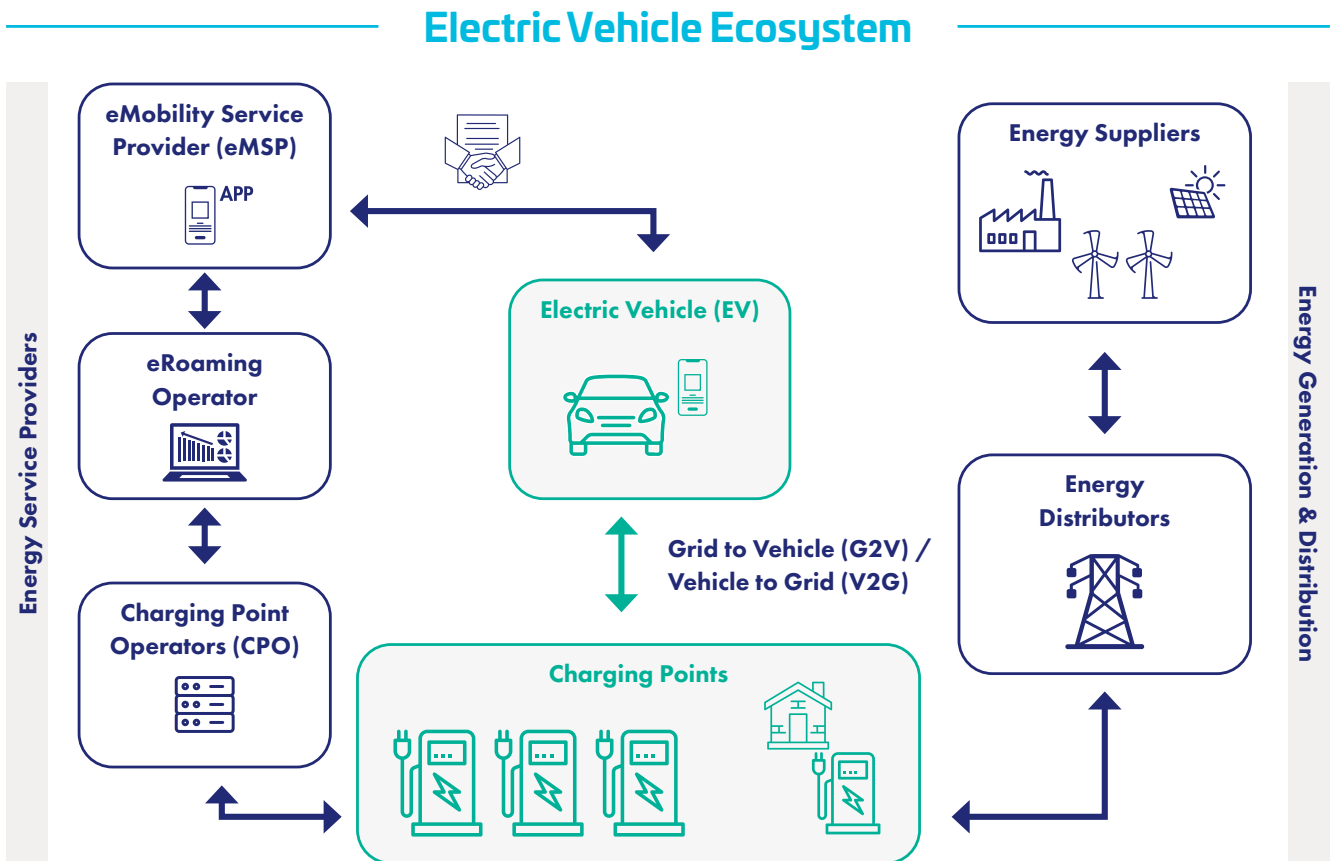
A new promising standard

The **ISO 15118 standard** makes this vision for EV charging a reality. ISO 15118 allows "Plug & Charge capabilities", where car and charging stations are assigned digital identities that are exchanged over the power cable (also called power line communication or PLC), enabling a mutual authentication, transparently performed each time the car is plugged in.

In a second step, extra authentication proof is given by the car to prove that it is associated with a valid eMSP subscription.

Plugging in your EV and charging it at any ISO 15118-compliant charging station is as seamless as switching on your mobile phone when landing in a foreign country.

In this scheme the "roaming operators" are enabling a perfect interoperability between all EV players, whatever the country of charge. Furthermore, the ISO 15118 standard will enable additional services such as Vehicle to Grid (V2G) and smart charging.



Main cyber risks associated with Plug & Charge

However, connecting the ecosystem further could lead to cybersecurity hacks if the security of the various elements is not well implemented.

The EV charging landscape can be compared to a mobile subscription use case. One difference is that the Digital ID of the subscription is not contained in the mobile phone's SIM card, but within the car.

One of the main associated threats could be the extraction and hacking of a digital identity associated with an eMSP subscription to inject them into another car. This attack would allow the attacker to pose as the genuine contract subscriber and charge his own EV at the expense of the genuine subscriber. In addition to the obvious financial loss, this kind of attack would decrease the level of trust in the plug and charge ecosystem, slow down adoption and deployment of other value-added services.

If e-Mobility is an important part of our modern societies, the electricity grid is the cornerstone of charging stations. It is of utmost importance that the massive deployment of EVs and charging stations do not hurt the grid's reliability. If hackers managed to take control of a large number of charging points, one identified risk would be to create a global grid blackout.

The world watched as cyber attacks against some country grid caused long outages a few years ago, showing that this scenario is far from theoretical. Critical and essential operators are becoming valuable targets for cyber attackers considering the catastrophic impact and huge damage caused.

Thales helps you implement the new standard securely

To implement the new ISO 15118 standard and establish trust with end-users and energy providers, each element of the ecosystem (car, charging station, eMSP) needs to receive a strongly diversified Digital ID and associated credentials. These need to be well and regularly managed to proceed to new security updates and credentials renewal anytime needed. Only this will enable the secure authentication needed between these elements, before any charging transaction.

With decades of digital security expertise across highly demanding markets including banking and aerospace, Thales offers a unique expertise to meet the most robust security needs. We help you design, build and operate state-of-the-art cybersecurity solutions to protect your critical assets, both onboard vehicles and in their environment.

Our cybersecurity solution – the [Thales Trusted Key Manager](#) - is deployed at all points of risk to protect and ensure the integrity of the entire ISO 15118 ecosystem. It provides:

- | **Secure ID generation and key provisioning** into the roots of vehicles and charging stations
- | **Mutual authentication** between legitimate stakeholders through secure cryptographic-based credential management
- | **Vehicle and charging point data integrity and confidentiality** through secure data encryption/decryption mechanisms based on standardized AES cryptographic algorithms
- | **Secure credential management** achieved through digital signature schemes.

Building a secure foundation - implemented in the core of the ecosystem elements - will prevent hacks, provide trust for end-users and ensure massive adoption.

Thales reliably connects and secures EV charging stations

Thales has a 25-year history of cellular eSIM connecting everything from metering applications and eHealth solutions to connected cars. We have been at the forefront of EV charging and smart energy infrastructure working with major providers worldwide. Designed for virtually any environment, Thales wide range of Connectivity Solutions are ideal to connect EV charging stations. Wherever they are, EV charging points must remain available and provide reliable connections for a decade or more, even in the most extreme environments (outside temperature, etc.). And this must be accomplished without burning through a device's battery or requiring expensive service visits.

Our comprehensive portfolio of hardware provides secure connectivity, thanks to [eSIM](#) and platform management solution (On-Demand Connectivity). These cellular solutions meet the stringent requirements for durability and power efficiency that are typical of smart grids.

Reliability and resiliency are must haves as is robust security. Our [Thales Connectivity Activation](#) solution, based on an IoT eSIM, automatically provisions service with the best cellular network during the first use of the device. It provides remote, automated connectivity updates, as needed, across the lifespan of the device to maintain 24/7 connectivity, avoid downtimes and eliminate costly physical maintenance. Thales' industry leadership in digital security protects unattended road charging stations – both physically and remotely. We provide tamper-resistant elements and the [Thales Trusted Key Manager](#) that can manage large fleets of charging stations credentials in real time.

With Thales, grid managers can ensure they always receive the most accurate data on energy used at EV charging stations, enabling them the most efficient grid management.

For more information about Thales solutions for Electric Vehicle charging, visit our [website](#)