

Beyond price transparency: managing tariff complexity in EV roaming

Understanding how complex pricing
models impact interoperability
between CPOs and MSPs



TandemDrive

Electric vehicle adoption is accelerating across Europe, and charging infrastructure is expanding rapidly to support it. With this growth comes an increasingly interconnected charging ecosystem where drivers expect to charge seamlessly across multiple networks, often using a single app, charging card, or vehicle-based authentication.

This seamless experience is made possible through roaming agreements between charge point operators (CPOs) and mobility service providers (MSPs). Through these relationships, EV drivers can access thousands of charging stations across different networks while maintaining a consistent interface through their chosen service provider.

Behind this convenience, however, lies a complex technical and commercial ecosystem. While public discussions about EV charging often focus on price transparency for drivers, the deeper operational challenge lies in the backend: ensuring that tariffs exchanged between CPOs and MSPs are reliably interpreted, applied, and validated across interoperable charging networks.

As pricing models evolve to support grid stability, energy market dynamics, and new commercial strategies, the exchange and interpretation of tariffs between CPOs and MSPs is becoming increasingly complex. Understanding and managing this complexity is becoming essential for operators seeking to scale their services efficiently.



The EV roaming ecosystem

To understand tariff complexity, it is important to first understand how EV roaming works.

Two primary roles define the charging landscape.

- ✗ **Charge point operators** (CPOs) operate the physical charging infrastructure. They install, maintain, and manage charging stations and determine the tariffs applied to those stations.
- ✗ **Mobility service providers** (MSPs) provide services directly to EV drivers. Through apps, charging cards, or integrated vehicle systems, MSPs allow drivers to locate chargers, start charging sessions, and receive billing.

In a roaming environment, these two parties interact through interoperability protocols such as OCPI (Open Charge Point Interface). These protocols enable operators to exchange information about charging locations, authentication tokens, charging sessions, and tariffs.

Originally, EV roaming was designed primarily as a B2B model in which CPOs provided charging services to MSPs, and MSPs managed the relationship with drivers. Regulatory developments such as the EU's Alternative Fuels Infrastructure Regulation (AFIR) introduced ad hoc charging requirements, enabling drivers to pay directly at chargers. While this improves accessibility, it also adds a direct B2C layer to an ecosystem originally designed for B2B interoperability.

When a driver starts a charging session through an MSP at a charger operated by a different CPO, several steps occur behind the scenes. The driver authenticates through their MSP, typically using a charging card, app, or plug-and-charge functionality.

The CPO verifies the request through the roaming interface and authorizes the charging session. Once charging begins, session updates may be exchanged between the systems as energy is delivered.

When the session ends, the CPO sends a Charge Detail Record (CDR) to the MSP. This record contains the information needed to calculate the final cost of the charging session, which the MSP then uses to bill the driver and settle the transaction with the CPO.

While this process appears straightforward, the pricing logic behind it can be significantly more complex.

Why EV charging tariffs are becoming more complex

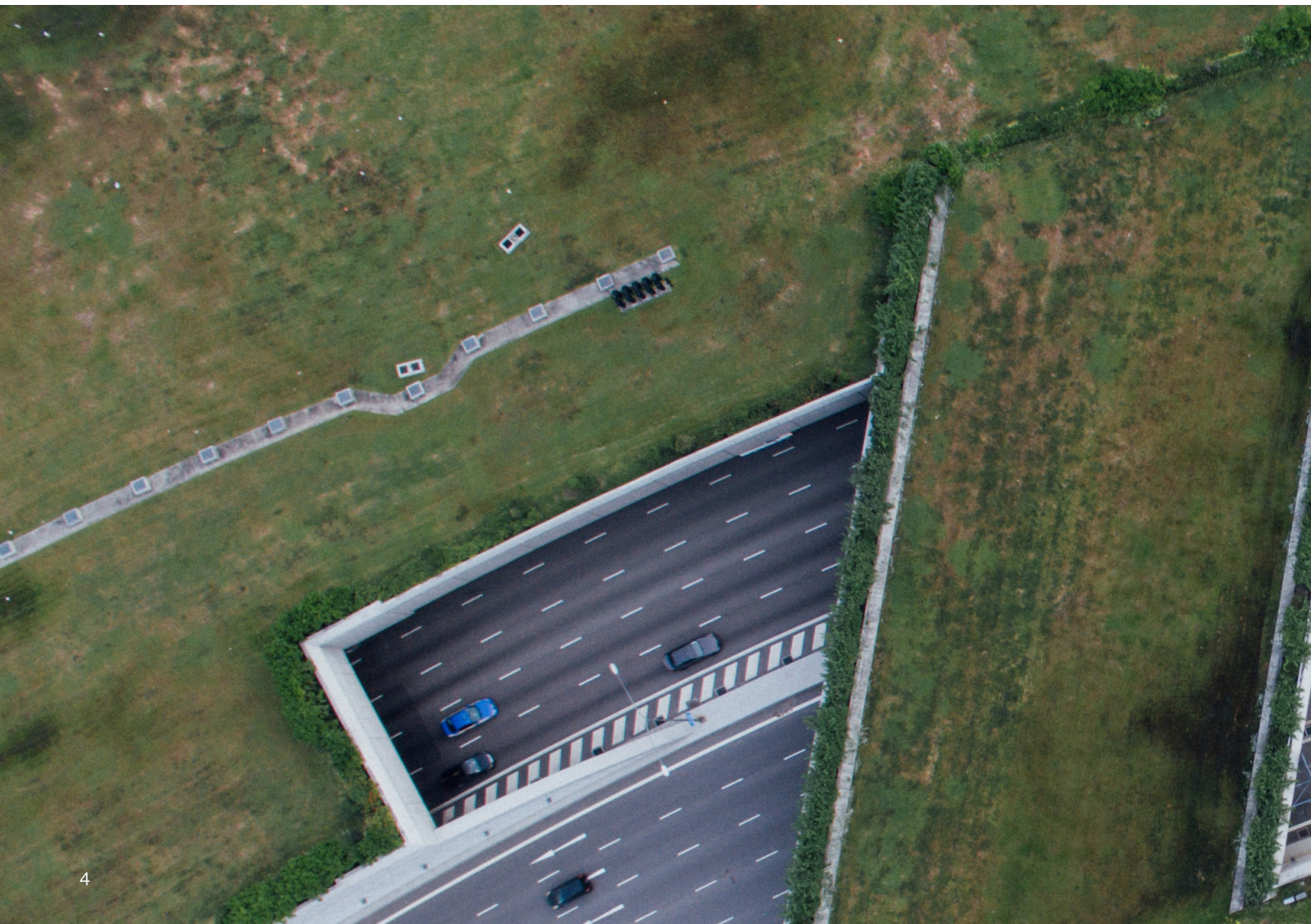
In the early stages of EV roaming, pricing structures were relatively simple. Roaming agreements often relied on straightforward wholesale prices, such as a fixed price per kilowatt-hour.

As the EV charging market matures, however, tariffs have evolved to support a broader range of operational and commercial goals.

Many operators now use tariffs to influence driver behavior or reflect real-time energy costs. These pricing models may include

time-of-use tariffs that vary throughout the day, dynamic pricing linked to energy markets, idle or blocking fees that discourage drivers from occupying chargers after charging is complete, and session start fees or location-based price variations.

Subscription models and membership discounts are also becoming increasingly common. These pricing structures allow operators to offer lower prices to drivers who commit to a monthly plan or frequently use a specific network.



The operational challenge of tariff management



For MSPs, the challenge is not simply receiving tariff information from CPOs, but interpreting it correctly and translating it into clear pricing for drivers.

Tariffs communicated through roaming interfaces typically represent wholesale pricing structures. MSPs must then build retail price models on top of these structures while ensuring that drivers receive clear and predictable costs. This creates a fundamental tension for MSPs.

While they must present predictable prices to drivers, the wholesale tariffs they receive from CPOs may contain dynamic elements such as time-based rates, idle fees, or energy-linked variations. Balancing simple retail prices with complex sourcing conditions introduces several operational challenges.

First, tariffs may contain multiple conditions, such as time restrictions, energy thresholds, or idle fees. These conditions must be interpreted accurately in order to build correct pricing models.

Second, tariffs may change frequently. When linked to energy markets or time-of-use structures, they may vary hourly or daily, requiring systems to continuously process and update pricing information.

Third, inconsistencies in how tariffs are structured can create interpretation challenges. The same pricing model may be represented in different ways across networks, requiring systems to normalize and interpret tariff data before applying it.

Finally, once a charging session is completed, MSPs must verify that the Charge Detail Record received from the CPO aligns with the tariff information that was previously communicated. If the final session price differs from what the tariff structure indicates, operators may face settlement disputes, manual reconciliation processes, or unexpected financial losses.

As charging networks grow and roaming relationships increase, manually managing these processes becomes increasingly difficult.

Managing pricing complexity across roaming networks

As tariff structures evolve and roaming ecosystems expand, operators require systems capable of managing pricing complexity at scale.

This includes the ability to interpret tariffs received through roaming interfaces, translate them into understandable price models for drivers, and validate charging session records against expected pricing rules.

By automating tariff interpretation and transaction validation, operators can reduce operational friction, minimize settlement disputes, and maintain confidence in their pricing models.

Solutions such as TandemDrive are designed to support this process by providing tooling that operates between roaming systems and commercial operations.

These systems help MSPs interpret complex tariff structures, build flexible price plans on top of those tariffs, and validate charging session data to ensure transactions align with the expected logic.

Rather than replacing existing roaming infrastructure, this type of orchestration layer helps operators manage the growing complexity that emerges as charging networks scale and pricing models evolve.

Looking ahead

Interoperability remains essential to the continued growth of the EV charging ecosystem. Drivers expect seamless access to charging infrastructure across multiple networks, and roaming agreements enable this experience.

However, as pricing models become more sophisticated and the number of roaming connections continues to increase, managing tariff complexity is becoming an increasingly important operational challenge.

While public discussion often focuses on price transparency for drivers, the deeper challenge lies in ensuring that tariffs are correctly interpreted, applied, and validated across interconnected charging systems.

Operators that can manage these issues effectively will be better positioned to scale their services, introduce innovative pricing models, and maintain trust across their roaming relationships.

As the EV charging market continues to evolve, the ability to orchestrate pricing across interoperable networks will become a critical capability for both mobility service providers and charge point operators.



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