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# GSMA Fusion: Automotive Vertical Convergence Report

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# Automotive Vertical Convergence Report

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## Purpose

Consolidate shared automotive ecosystem demand for MNO network capabilities and CAMARA/Open Gateway APIs.

## Source

GSMA Fusion automotive roundtable (2 March 2026, MWC Barcelona).

## Strategic Takeaways for MNOs & GSMA Open Gateway:

While the technical demands of the automotive sector are complex, the overarching strategic message to MNOs and the GSMA is clear: the automotive industry is shifting from treating the network as a "dumb pipe" to an integrated, intelligent component of the vehicle's operating system.

For MNOs and CAMARA to capture this value, they must align with the following strategic realities:

1. The industry rejects "best-effort" connectivity for safety-critical services (like tele-driving). MNOs have a massive opportunity to monetize dynamic, on-demand performance (QoD evolution, slicing, uplink prioritization). Crucially, the monetization model is shifting universally to B2B2C.
2. Vehicles have decades-long lifecycles and cross international borders. MNOs must reduce the friction of "country-by-country" integration by committing to global API interoperability and unified remote SIM/subscription management (SGP.32).
3. For MNOs to capture the massive compute market in mobility (Edge AI), they need to show they can deliver flawless connectivity that OEMs can trust.

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## Executive Summary

### Top convergence signals:

1. Lifecycle connectivity & subscription/SIM management across the full vehicle lifetime
2. Connectivity assurance & observability to reduce the “network as a black box”
3. Predictable quality-on-demand
4. Teleoperation/ robotaxi connectivity needs
5. Interoperability across connectivity options (public/private, cellular/Wi-Fi; multi-network/parallel network strategies).
6. Trust signals (secure authentication/integrity; network-assisted location verification especially where GPS is unreliable).

### Why this matters now (pain points):

7. Network as a black box → slow root-cause resolution and degraded service when connectivity issues occur.
8. Best-effort reality → operators cannot guarantee everything; automotive services still need predictable ways to manage risk during congestion/special events.
9. Fragmented global availability → OEMs shipping across markets face country-by-country integration and inconsistent capability availability
10. Mismatch between long vehicle lifecycles and fast network evolution → need for lifecycle-safe connectivity management and forward visibility on what APIs will be deployed.
11. Cost and commercial pass-through → prioritisation/value-add models need clarity on who pays and when to invoke premium controls.

### How MNOs can help (to solve the pain points above):

12. Provide operator-safe network experience/diagnostic signals so OEMs can troubleshoot and monitor vehicle connectivity—reducing the “black box” pain point.
13. Enable on-demand quality controls (QoD and/or prioritisation patterns) that can be invoked during congestion/special cases, aligning with best-effort realities while improving operational predictability.

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14. Support lifecycle subscription/SIM operations at scale (activate/deactivate, profile management, portability) so vehicles remain connected through resale and long lifetimes, reducing fragmentation and operational friction across markets.

## **CAMARA/Open Gateway solutions needed/capability gaps:**

15. Evolve QoD for automotive suitability (industry signals QoD v1.0 is not fully suitable and points to v1.1/v2.0) to improve predictable service controls.
16. Explore a standardised network experience / observability abstraction (e.g., traffic-light style indicators) that helps OEMs diagnose and anticipate issues without requiring operators to expose sensitive internal telemetry.

## **Convergence Signals : Core Findings**

### **Theme 1 - Lifecycle connectivity & subscription/SIM management (full vehicle lifetime)**

- What automotive industry is asking for: vehicles need lifecycle connectivity that survives ownership changes, cross-border resale, and a full product lifetime. Automotive participants want the ability to provision, switch, and manage subscriptions/eSIM profiles reliably over time and across markets without redesigning hardware for each region.

"If we want to provide a better user experience and more innovative service to drivers and customers, we need to leverage more of the advanced capabilities from the mobile network." –

**Lei Zhong, Toyota Motor Corporation & AECC**

### **What this requires from MNOs:**

- Support remote subscription/SIM lifecycle operations (activate/deactivate, swap profiles, manage at scale) suitable for long-lived fleets and consumer vehicles.
- Enable cross-market portability so vehicles can remain connected when sold abroad, with minimal friction and consistent operator processes.
- Provide consistent commercial/operational interfaces via aggregators/channel partners where relevant, to reduce "country-by-country" integration burdens.

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## **Theme 2 — Connectivity assurance & observability (reducing the “network as a black box”)**

- What automotive industry is asking for: the network is experienced as a black box. When something goes wrong, services need to quickly determine whether the issue sits in the vehicle, the device/subscription, or the network. Beyond troubleshooting, OEMs and service providers want access to the network’s view of the “lived experience” (service quality/conditions) so they can monitor performance over time, anticipate issues, and manage customer experience without requiring operators to expose sensitive internal telemetry.

"The network is just a black box to us, and it would be great to have some feedback and predictability of network performance". – **Tuuli Tolmats-Aia, Elmo Remote**

### **What this requires from MNOs:**

- Provide an operator-safe “experience signal”: a simple, standard abstraction (e.g., traffic-light style indicators) of current service condition/health that can be consumed by automotive systems without exposing internal network details.
- Enable fault isolation: signals that help answer “is it the vehicle or the network?” (e.g., connectivity session status, reachability, basic diagnostics) to accelerate root-cause resolution.
- Expose ‘lived experience’ data for monitoring: an agreed level of historical/near-real-time network experience visibility so OEMs can monitor quality and correlate issues with customer experience.

## **Theme 3: Predictable quality on demand (QoD evolution + prioritisation/slicing patterns)**

- What automotive industry is asking for: automotive services require predictable, controllable network quality that can be invoked when needed—especially for safety-related services, teleoperation/remote driving, and high-stakes moments like congestion at major events.

"If we think about scaling in the future and commercialisation on a really wide scale, then the capabilities of 5G and network APIs becomes really important". – **Tuuli Tolmats-Aia, Elmo Remote**

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- The industry signal is that QoS v1.0 is not fully suitable for automotive and needs evolution (v1.1/v2.0) to match automotive requirements.

## What this requires from MNOs:

- Offer an on-demand quality control mechanism: the ability to request uplifted quality for a defined flow/session when needed (and release it when not needed), rather than reserving premium resources permanently.
- Support safety/operational traffic differentiation: recognise that not all vehicle traffic is equal (e.g., safety-related flows vs OTA updates) and enable tailored treatment aligned to service criticality.
- Handle congestion / special cases transparently: provide predictable behaviour during “1%” extraordinary situations (events, disasters, base station outages), acknowledging best-effort and regulatory constraints while giving services options to manage risk.
- Make the control commercially usable: clarity on when uplift can be invoked, how it is priced, and who pays (OEM/service provider/end user) so automotive services can decide “when to buy quality”.
- Interoperate across markets: deliver consistent API behaviour and availability across geographies (“available everywhere”), ideally via operator/aggregator models to avoid country-by-country re-integration.

## Theme 4: Teleoperation/robotaxi connectivity (uplink-heavy, real-time, congestion resilience)

- What automotive industry is asking for : teleoperation and robotaxi services require real-time, resilient connectivity that holds up in the hardest conditions—especially uplink-heavy scenarios and congested event environments. The requirement is not “high bandwidth all the time” but minimum connectivity that can be maintained.

**“We demand minimum guaranteed bandwidth for uplink. And also, very critically, we require real-time connectivity as much as possible.” – Oliver Lei, Zoox**

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## What this requires from MNOs:

- Uplink-first performance controls: prioritise uplink where teleoperation/robotaxi services depend on it, with stable behaviour in dense urban environments.
- Low-latency / low-jitter pathways when needed: support practical safety thresholds (e.g., maintaining sub-~200ms end-to-end latency for remote driving where feasible)
- Congestion resilience in “hot moments”: predictable behaviour at major events and hotspots
- Ability to use private 5G / isolated resources in defined areas to avoid public-network congestion (where available), and to interwork smoothly with the public network beyond those zones.
- Operational visibility + decision inputs: signals that help services choose when to adapt (e.g., where congestion is, when to prioritise, when to take alternative routes), especially around pick-up/drop-off zones and complex RF areas.

## Theme 5: Interoperability across connectivity options (public/private, cellular/Wi-Fi, multi-network strategies)

- What automotive industry is asking for: automotive services need to combine and orchestrate multiple connectivity options (cellular, Wi-Fi, and in some cases satellite) rather than treating each as a separate silo. This includes smooth interoperability between private networks (e.g., factory/campus) and the public network when vehicles move beyond the site, and the ability to use multi-network strategies (including parallel connections) to maintain service continuity in hard-to-cover or congested areas. A recurring requirement is having clear thresholds and policies for when to switch or blend connectivity options and receiving enough network context to make those decisions safely.

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## What this requires from MNOs:

- Enable seamless public/private interworking: predictable handover and service continuity when a vehicle moves from a campus/private network to the public network (and back)
- Expose decision thresholds & policies: provide usable indicators/parameters that services can use to decide when to switch, blend, or maintain multiple connections (cellular/Wi-Fi/private), including guidance on “smooth switching.”
- Support multi-network strategies at scale: allow services to rely on parallel connectivity approaches where needed (e.g., for tele-driving continuity).

## Theme 6: Trust signals: secure authentication, integrity & location verification

- What automotive industry is asking for : connected-vehicle services increasingly depend on trust signals from the network to make decisions safely and to protect users. That includes secure authentication when vehicles switch between connectivity options (e.g., cellular ↔ Wi-Fi), and stronger ways to confirm who/what is connecting (e.g., verifying the driver identity in remote services and reducing the risk of “corruption”/tampering). It also includes location verification that goes beyond GPS using the network to validate that a reported position is real, especially where GPS is unreliable (e.g., tunnels or underground) and where application data could be modified.

## What this requires from MNOs:

- Secure authentication signals across access types: support secure authentication when switching between cellular and Wi-Fi (and other access options), so services can maintain continuity without weakening trust.
- Identity & integrity assurances: network-assisted signals that help confirm “who/what is connecting” (e.g., driver/device identity checks) and reduce risks of tampering/corruption in remote services.
- Network-assisted location verification: the ability to verify that a reported location is genuine (not just claimed by the app), especially in GPS-challenged environments (tunnels/underground).
- Consistency across markets and networks: predictable availability and behaviour across geographies/operators so authentication and verification can be relied on at scale.