

Connecting the road ahead: 5G and the future of cars

Without reliable connectivity, connected cars become just cars



The car-as-a-smartphone, infotainment, assisted driving, and over-the-air update capabilities that drive new levels of customer experience depend on high-quality connections.

The 5G rollout offers one opportunity to access the right network, yet carmakers must not assume that mobile connectivity will be appropriate for all the V2X (vehicle-to-everything) services they want to enable.

Giving cars the ability to use cellular connectivity is not new: the first vehicles with connected features entered the market in the mid-90s. Yet while those early innovations were focused on single-use cases such as safety, today's cars are much more like smartphones than simple transportation.

The right networks, coupled with internet of things (IoT) connectivity, can support OEMs in delivering phenomenal driving experiences. That might be secure and instant in-car payments and accurate traffic information. It could be high-quality infotainment for passengers. As OEMs accelerate their electric vehicle transitions and adopt Car-as-a-Service models, the right coverage can deliver greater connected car capabilities.

And that demands reliable coverage.

But this isn't just about ensuring in-car calling or accurate GPS; everything from over-the-air (OTA) software updates to electric vehicle battery management requires a connection. High-quality, guaranteed coverage is critical for developing assisted and autonomous driving.

However, the introduction of autonomous vehicles (AV) will increase demands on networks and connectivity, already handling significant volumes of IoT-driven data traffic. An Omdia report notes that AVs in testing transmit around four terabytes of data daily. At these levels, less than half a million AVs would generate the same data traffic as the 230 million connected cars currently on the market.¹ While production AVs are likely to transmit less data, it does highlight the demands self-driving vehicles will place on networks.

“The pace of rollout of advanced connected-car use cases is highly contingent on the availability of 5G.”

McKinsey

The connectivity challenges

To enable all this, whether it's the in-car experiences of today or the self-driving vehicles of twenty years from now, certain challenges need to be overcome.

The first is coverage. Everyone knows the feeling of not having a mobile signal; even today, certain parts of the world are not covered by 3G or 4G networks. As cars become more connected, losing signal goes from being an annoyance to an issue affecting functionality. As well as terrestrial networks, car makers must consider satellite-enabled non-terrestrial networks and how they can deliver connectivity.

Car manufacturers also need to consider where they offer services and who to; it's no good pushing features that require a consistent, high-quality signal to customers that spend a significant portion of their travel time in areas with limited network coverage.

Secondly, there is the question of roaming. It's one thing having agreements between telecom operators to handle smartphones' data and voice requirements; the implications of connected vehicles moving across multiple jurisdictions are very different.

Related to roaming is a more fundamental challenge; the reality is that the quality of networks and the frequencies they use varies from country to country, even within the European Union. Today it is an experience issue; it will be a functionality concern in the future.

It will also be a safety issue. New vehicle assessment programs such as Euro NCAP are already reviewing how V2X communication should be tested, and maintaining connectivity is likely to be a key issue under consideration.

There is also another obstacle that needs to be navigated: understanding the role of 5G in connected cars and AVs.

The different types of 5G networks

5G has been heralded as the next-generation network technology enabling AVs and other cutting-edge use cases. Yet the 5G that people use for their smartphones is not the same type of network that can support AV rollouts.

Most of the 5G network that has been rolled out is non-stand-alone (NSA), working with existing 4G networks to provide greater capacity for download bandwidth and handle more connections. It uses a new 3.5 GHz frequency band to deliver many of the features connected cars offer today.





The easiest way to look at it is to consider three phases based around using 5G to support vehicle-to-everything communication, a pre-requisite of AVs:

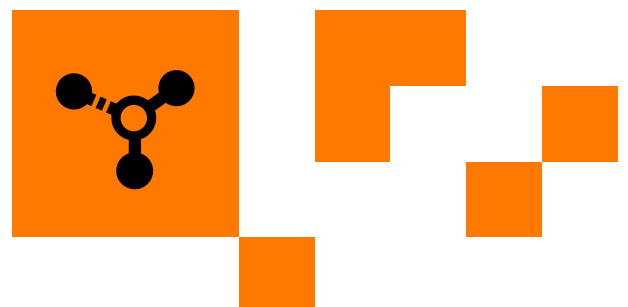
- 1 Short-term:** NSA 5G supports the deployment of hazard information collection and sharing
- 2 Medium-term:** NSA 5G enables the sharing of data around dynamic objects, identifying vulnerable road users
- 3 Long-term:** true autonomous driving can only be powered by stand-alone (SA) 5G networks

5G SA is based on a new core network that does not use existing infrastructure and therefore requires significantly more investment to be rolled out.

Finding the right partners

To deliver all this requires working with the right partners. OEMs need to be working with:

-  **Network experts** with demonstrable experience in building and operating 5G NSA and 5G SA networks
-  **Nationally recognized operators** that regulators have named as delivering best-in-country mobile networks
-  **Telecom leaders** with international presence, roaming agreements and partnerships in multiple markets
-  **IoT experts** that can marry a deep understanding of IoT technologies and connectivity with network specialists



Four steps to reliable connections


- 1 Understand the 5G differences:** 5G can enable a huge range of connected car and AV use cases, but OEMs need to understand first and foremost that the 5G powering smartphones is not the same network that will enable autonomous driving.
- 2 Tailor connected offerings based on coverage:** OEMs have always needed to know which cars and services were relevant to different audiences. Now, they also need to consider the network and connectivity implications of how buyers intend to use cars.
- 3 Don't forget passengers:** The demands of car users will vary depending on whether they are driving or being driven. Drivers need connectivity for traffic information, driving assistance and voice services. Passengers are looking for more entertainment-focused services, which will increase bandwidth and capacity requirements.
- 4 Build a 5G ecosystem:** Delivering connectivity that works for drivers will require partnerships and agreements, from covering roaming to ensuring coverage regardless of location via NTN. This will require working with multiple partners or providers with established agreements.




Why you should choose Orange Business


Orange Business has more than ten years of experience working with automotive leaders, supporting traditional and newer OEMs in developing and deploying new business models. Our capabilities include:

5G A 5G network that provides a future-proofed backbone to support innovative use of streaming services, coupled with heritage as one of Europe's leading telecom companies to deliver a leading network

 **Member of 5GCroCo**, a pan-European project working on cooperative, connected and automated mobility services in a cross-border environment

 **Global coverage**, built on an extensive network of roaming agreements and partnerships

 **Named best mobile network provider** twelve times in a row by French telecoms regulator ARCEP

 **A global presence** to support OEMs in any continent as they access new markets

Orange Business is the digital partner for OEMs seeking a complete connected car solution.

1. <https://omdia.tech.informa.com/OM025691/Automotive-Media-In-Car-Entertainment-and-Landscape>