How 5G is the Connected Car's Biggest Enabler

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Evolution of the connected car

The connected car has been a growing reality for decades. It was GM in partnership with Motorola that introduced the OnStar service back in 1996. Using its own embedded chipset and antenna, the platform gave GM an early start.

With the advent of 3G came a broader market adoption of the connected car. Today vehicles leverage our smartphones' powerful connectivity and software platforms to provide us with services through Apple CarPlay or Android Auto.

Currently, vehicles have 2 main modes of connectivity:

- **Telematics**: relating to operational vehicle data such as location, speed, status, diagnostics, etc. It's used widely for maintenance, fleet management, innovation and in some cases to alert first responders immediately after an accident (e.g. OnStar).

- **Infotainment**: pertaining to user-centered services such as navigation, audio, calls, voice-to-text, Alexa, remote controls for engine-start or climate control, etc.

While cars remain some of the most important machines our societies depend on, they aren't smart devices. They're complex mechanical gadgets with components of smart devices. **The current challenge is making the car connected as a true, fully integrated smart device.**

If you compare the connected car with the evolution of the cell phone into the smartphone, we are just in the era of Symbian, Windows Mobile or Blackberry on GPRS or EDGE. You were able to walk around, do emails, send texts, make calls, navigate and listen to music, but the overall interconnected ecosystem where a multitude of devices communicate with each other and the cloud was not yet a reality.

At the time of its release, the first iPhone had more capabilities than the network could accommodate. As a massive flurry of users got a taste of the iPhone's broad features, operators sped up 3G deployment to accommodate the explosion of disruption. App development became the new cool to fuel a variety of innovative services we now can't live without and a whole novel industry of related devices (e.g. tablets, wearables) came to be. Similarly, this is what's about to happen with cars as they **break away from their smartphone dependency** and transition into becoming **smart devices** themselves.

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Challenges and outcomes ahead

Expanding the car's technology stack with ample **real-time connectivity and autonomous processing capacity** is the next step in this evolution. Unlike with the launch of the first iPhone where Apple understood the telecom operators' limits (and motivations), most automotive OEMs lack the capabilities required. For this revolution it will be the t**elecom operators and other market players that will push and cooperate with the OEMs.**

The next leap for the connected car is a newer connectivity mode called **Vehicle to Everything (V2X)**. In other words, the car joins the IoT family by having it connect to anything that may be relevant to the vehicle such as pedestrians, traffic lights, other vehicles nearby, emergency services, businesses, etc.

As vehicles connect to everything a **new ecosystem of possibilities** will emerge. For instance, vehicle-to-vehicle (V2V) connectivity will prevent accidents, traffic jams and provide the closest parking available on-demand; vehicle-to-pedestrian (V2P) will avoid accidents and facilitate efficient ride-sharing; vehicle-to-infrastructure (V2I) will prevent accidents, decrease energy use (emissions), allow passive toll or parking payments, as well as automatic door/gate access; vehicle-to-network (V2N) will enable a vehicle to receive information about road conditions and traffic around the area; vehicle-to-cloud (V2C) will provide predictive analytics in a wide variety of applications enabling newly disruptive services and advance mobility innovation.

Vehicle to Everything Graphic by Opentrends

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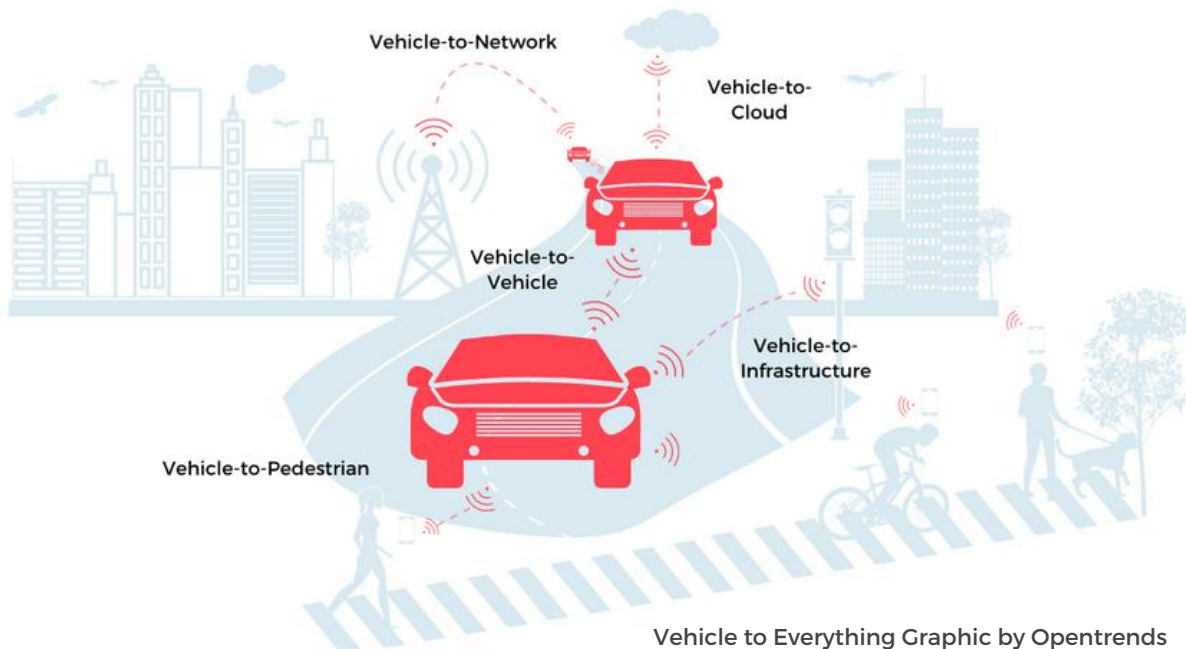
Current networks do not offer the latencies, bandwidth or slicing capabilities necessary for this new ecosystem to flourish. However, 5G with its millisecond latencies, a bandwidth 10 times that of LTE/4G, and a 9.999% transmission reliability paves the road for it.

There are already **over 13,000 5G deployments around the world**, of which **about 6,000 are in the U.S.** Currently; 35 U.S. cities have partial 5G coverage. Telecom operators and related parties are developing the different communication standards necessary for a broad spectrum of devices, including cars.

As the **connected car evolves into this new competitive landscape** OEMs will also compete with companies like Lyft, Uber, Waymo and many others offering Mobility as a Service (MaaS). Currently with the units shipped model, OEMs monetize about 1 cent per mile driven, but with MaaS and additional revenue streams afforded by the new connected realm, that monetization could grow to 25 cents per mile.

Mobility as a Service (MaaS)

OEM potential monetization growth from 1 to 25¢/mile

- **MaaS responds to different forms of transportation services integrated into one single platform. Users can access and pay through the same mobile channel.**

- **It has the potential to make cities environmentally conscious with their mobility choices, while reducing the amount of personally-owned vehicles.**

cleaner cities and healthier lifestyle

safer ways of transport

personalized on-demand mobility solutions

real-time information and data-sharing

OEMs will have to navigate strategically to successfully partake in this new ecosystem. However it is **not only automotive OEMs that will be impacted, infrastructure manufacturers will face technological challenges too**. They will not only have to include the connectivity means onto their designs, but very likely a fair amount of Edge computing capabilities. Infrastructure manufacturers and operators will also be able to reap the benefits, through additional monetization or savings (e.g. lighting infrastructure that is only illuminated when required, parking spots auctioned in real time…). **Governments will benefit as well**, by being able to tax miles driven as opposed to relying on purchases (actual vehicle and gas) and annual vehicle registrations, which all be impacted as the market transitions to electrical vehicles and MaaS.

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5G will accelerate a new mobility revolution

The connected car is the stepping stone for the fully autonomous self-driving vehicle. Before cars can be let out roaming by themselves the artificial intelligence (AI) platforms will need to learn how humans drive cars in every locality. The only way to do that is to equip cars with the ability of environmental awareness beyond its sensors. **Connected cars will gather massive amounts of data** related to our peculiar driving habits and the many related interactions that influence driver decisions. This data will feed the AI platforms and gradually reduce the level of driver involvement.

Business Insider Intelligence and others predict that the autonomous vehicle **(AV) will reach about 5% of the U.S. motorized vehicle fleet by 2025**. These estimations may include non-fully autonomous, such as Level 3 (driver is expected to take over when alerted) and Level 4 (fully autonomous when geofenced or in controlled areas). So it may be a while longer before the Siris or Alexas of the world become our full-time chauffeurs.

0 A human performs all driving tasks. No automation.

1 A human drives the car, with some assistant features controlled by the vehicle, such as cruise control.

2 The vehicle has more than one automated function, but still requires humans to monitor the vehicle at all times.

3 The vehicle can manage safety-critical functions in a specific environment. A human is not required to monitor the vehicle at all times, but expected to take control upon notice.

4 The vehicle can perform all driving tasks in specific environments. Human's vehicle control is optional.

5 The vehicle can perform all driving tasks in every situation. Vehicle achieves full automation.

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Mobility is one of the most important foundations of civilizations. Think of the horse-pulled wagon, the steam train, the horseless carriage (first automobiles), all the way to our modern highways. Each one of these milestones had a major transformational impact on wealth creation and quality of life.

With 5G we can completely revolutionize the way we move once again, **improving not only our efficiency and quality of life** (e.g. spending less time on the road or not having to buy a car), but potentially also **our environment** by being more efficient and therefore reducing wasted energy (e.g. traffic jams, idling or circling while looking for parking).

This is an exciting moment in auto tech. Even though 5G is still limited, and fully self-driving cars are still a thing of the future, the time for companies to think about where they can get ahead and how they want to stand out in this evolution is now.

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Our extensive experience in this vertical

At Opentrends we have successfully completed several connected car projects for major automotive OEMs and other IoT players:

- Applications for Apple CarPlay and Android Auto: We have developed applications that extract data from the vehicle and help the user improve their driving and maximize their efficiency.
- Carpooling apps: We have also implemented carsharing and ridesharing solutions, an upward trend today.
- Remote access applications: we have contributed to implementing remote access solutions to vehicle information using mobile data.
- Infotainment system applications: We have worked on projects to implement voice assistants and other applications to vehicle infotainment systems.
- Infrastructure platforms: We have developed real-time operational platforms for major world cities, enabling intelligent traffic controls, instant air quality & emissions management while increasing citizen cooperation.

Author: Anselm Bossacoma

About Opentrends

Opentrends is an international software solution provider. Its strengths are strategic thinking, creativity, and reliability. Experienced in the integration, implementation, and adoption of the most advanced technological solutions, Opentrends places its clients on the digital transformation path, facilitating the creation of new value, and contributing to growth acceleration.

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