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The Value of Standardized Technology to Connected Cars

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The Value of Standardized Technology to Connected Cars¹

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Executive Summary

Connectivity allows modern-day automobiles to improve their functioning and to enhance the user experience. There is a wide range of connected car applications based on standardized technologies being offered at present by various automobile manufacturers. This is achieved with features that range from increasing safety to allowing access to music and other forms of entertainment for the drivers and passengers to enjoy.

Five types of connectivity can be differentiated regarding cars, depending on the devices and environments to which the car connects: (1) *Vehicle-to-Infrastructure (V2I)*, for communication with devices which are part of the transportation infrastructure; (2) *Vehicle-to-Vehicle (V2V)*, for communication with other surrounding vehicles without intermediaries; (3) *Vehicle-to-Cloud (V2C)*, for connection with off-board cloud computing system; (4) *Vehicle-to-Pedestrian (V2P)*, which includes people on foot but also other road users such as cyclists and public transport commuters; and (5) *Vehicle-to-Anything (V2X)*, when multiple simultaneous connections on different levels and with different vehicles, infrastructures and other objects are required.

Those five types of connectivity are combined and employed to provide different connected car applications to users. The following are the main categories of connected car applications which can be found.

- Mobility. Such as navigation, Real-Time Traffic Information (RTTI), parking, route optimization, etc.
- Safety. Such as information on road conditions, real-time warning of road hazards, response to crashes or theft, etc.
- Entertainment. Such as hotspot, music, podcasts, multimedia content for passengers, etc.
- Vehicle Management. Such as vehicle status (mileage, tire pressure, fuel levels), maintenance, remote applications, etc.
- Breakdown. Such as component diagnostics, health reports, and other outbound services, etc.
- Driver assistance and comfort. Such as autonomous driving, Advanced Driver-Assistance Systems (ADAS), climate control, detection of driver's fatigue or drowsiness, etc.

¹ Sunil Arya, The Value of Standardized Technology to Connected Cars, GRUR International, Volume 69, Issue 4, April 2020, Pages 365–379. <https://doi.org/10.1093/grurint/ikaa042>.

- Commercial. Such as information about fuel stations (including prices), restaurants, tolls, insurance, etc.
- Lifestyle. Such as in-car office (e-mails, contacts), personal assistants, partner networks, etc.

The interaction amongst connected cars and, to the external environment is achieved, thanks to technical standards, which are technical specifications set and developed by Standard Development Organizations (SDOs). Members of these organizations contribute their technologies to form part of the standard. As these technical contributions are often the outcomes of massive research and development investments. Companies usually protect such investments by intellectual property rights (IPRs), in the form of patents, in particular, so-called standard essential patents (SEPs). In order to promote the success of the standard, SDOs encourage their members to make their SEPs available on fair, reasonable, and non-discriminatory (FRAND) terms and conditions. FRAND manifests the value that the standardized technology brings to the end-product, trying to balance the interests of those who invested in the development of the technology and those who wish to access and implement it at reasonable prices. FRAND is traditionally determined by the concerned parties in bilateral patent licensing negotiations. Only when parties disagree may they end up in litigation.

An indication of the value that standardized technologies bring to cars can be found in the prices paid by consumers to enjoy connectivity-based features in their vehicles. Automobile manufacturers have different approaches to the connected car services that they provide. Moreover, within the same manufacturer, multiple tiers of the connected car services are offered for different brand segments. Therefore, a wide range can be observed in connected car services offered by various automobile manufacturers and the corresponding pricing.

The paper shows data collected from 15 car manufacturers regarding the connected car services offered and the prices that consumers are paying to avail such services. The data is presented in the form of the accumulated price that a user would have to pay for the connected car services for a period of eleven years (which is the average time that consumers maintain a new car in Europe). Corresponding prices are collected for each tier of connected car services that the automobile manufacturers offer and additional one-time expenses (if any) and free subscription periods included with new vehicle purchases were also taken into account.

The variety of connected car packages offered by the automobile manufacturers ranges from two (Fiat, Tesla, and Volvo offer connected car services under two packages each) to ten (Mercedes-Benz offers connected car services under ten different packages). The prices through an 11-year period for the best-possible connected car application package across automobile manufacturers range from a €300 package offered by Opel to a €20,586 package offered by Porsche.

Automobile Manufacturer	Price for Best-Possible Connected Car Package (Euro/ 11 Years)²
Audi	2,548
BMW	3,152
Fiat	600
Ford	761
Honda	3,303
HYUNDAI	6,168
Jaguar	2,603
Mercedes Benz	4,396
Opel	300
Porsche	20,586
Skoda	1,430
Tesla	896
Toyota	3,151
Volkswagen	1,846
Volvo	1,467

To accurately estimate the economic value of the patented technologies, not only the revenues generated out of connected car services, but also other costs incurred by the automobile manufacturers are needed. Automobile manufacturers could also save costs and enjoy additional value enabled by cellular technology, such as improved car maintenance through over-the-air software updates or the prognosis of problems in cars by ‘on the fly’ monitoring of car parameters. Unfortunately, those incurred costs and additional generated value, in large part are not publicly available.

Finally, for connected cars, the market has shown that it is able to offer alternatives to bilateral licensing negotiations that further facilitate licensing. An example can be found in AVANCI³, a licensing platform which offers licenses for the essential patented technologies used by commercial cars. AVANCI also makes its package license prices publicly available, pricing it as follows: \$ 3/vehicle for eCall only, \$ 9/vehicle for 3G (including 2G and eCall) and \$ 15/vehicle for 4G (including 2G/3G and eCall)⁴. Considering the value added to the automotive industry and the cost savings enabled by cellular connectivity⁵ it does not come as a surprise that several large car manufacturers (such as BMW, Porsche and Volkswagen) have already agreed to these market rates.

² The cumulative price is calculated by adding prices of the individual connected car application package and removing overlapping packages, in order to derive prices for best possible connected car application package that a consumer can have.

³ <https://www.avanci.com>.

⁴ <<http://avanci.com/pricing/>> accessed 20 May 2019.

⁵ Heiden, Bowman. 2019. “The Value of Connectivity in the Automotive Sector – A First Look.” SSRN Scholarly Paper ID 3521488. Rochester, NY: Social Science Research Network. Available at SSRN: <https://papers.ssrn.com/abstract=3521488>.