Vehicular connectivity: state of play, future trends and the impact of 2G/3G sunset

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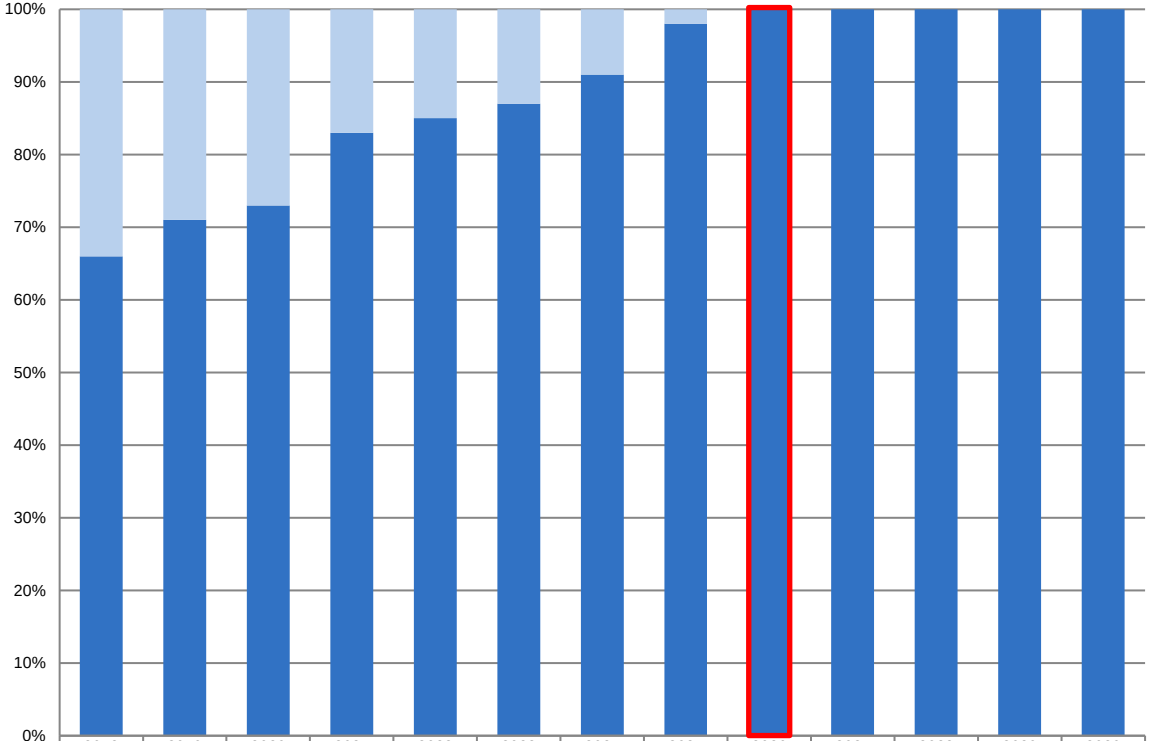
The state of play of vehicular connectivity

By 2026 all new cars sold in the UK will be “connected”

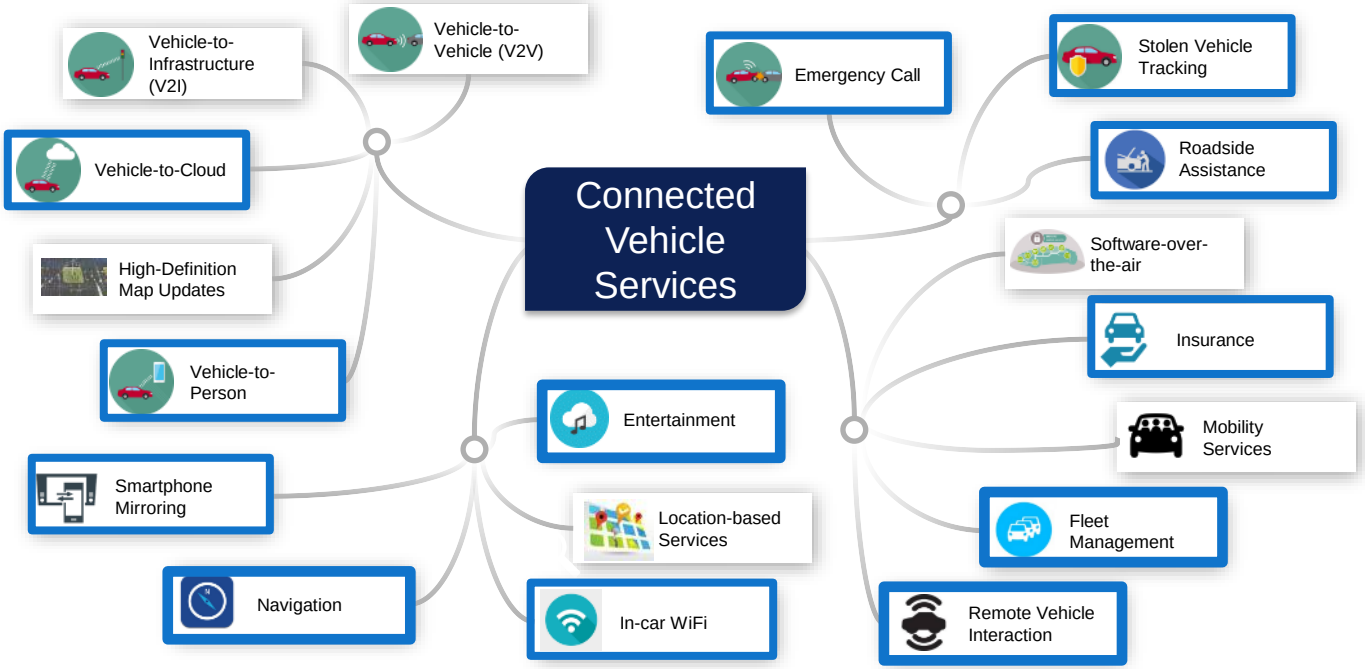


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Not Connected	34%	29%	27%	17%	15%	13%	9%	2%	0%	0%	0%	0%	0%
Connected	66%	71%	73%	83%	85%	87%	91%	98%	100%	100%	100%	100%	100%

Forecast of connected cars as a proportion of UK new passenger car registrations

Source: Frost & Sullivan (2019), Connected and Autonomous Vehicles: Winning the Global Race to Market.

Connected vehicle services today and in the future



UK has the potential for wider connected vehicle services deployment

	CAV Index / Benchmarking	Enabling Regulations				Enabling Infrastructure					Market Readiness				
		General Regulation	Civil Liability/ Insurance Framework	Road Traffic Laws	Total Score (Out of 3.5)	Digital Infrastructure 4G Speed (Mbps)	Digital Infrastructure 4G Coverage (%)	5G Pilots/ Tests	Deployable Road Miles	Total Score (Out of 3)	ADAS uptake	Connected Car Uptake	MaaS Uptake	DRT Fleet Size	Total Score (Out of 3.5)
Countries/ Weights	**100%**	**10%**	**12.5%**	**12.5%**		**5%**	**10%**	**5%**	**10%**		**10%**	**10%**	**7.5%**	**7.5%**	
United Kingdom	**8.4**	8.0	8.0	9.0	**2.9**	4.0	7.7	6.0	9.0	**2.2**	9.0	9.0	10.0	10.0	**3.3**
France	**6.1**	6.0	4.0	6.0	**1.9**	4.5	6.8	4.0	6.0	**1.7**	8.0	9.0	8.0	3.0	**2.5**
Germany	**7.2**	8.0	4.0	10.0	**2.6**	3.9	6.6	6.0	7.0	**1.9**	10.0	9.0	10.0	2.0	**2.8**
Netherlands	**6.4**	8.0	4.0	7.0	**2.2**	8.2	9.0	2.0	7.0	**2.1**	8.0	6.0	8.0	2.0	**2.2**
United States	**8.0**	10.0	4.0	9.0	**2.6**	2.5	9.0	10.0	8.0	**2.3**	8.0	10.0	8.0	8.0	**3.0**
Japan	**6.2**	6.0	6.0	6.0	**2.1**	4.5	9.5	6.0	8.0	**2.3**	9.0	4.0	6.0	1.0	**1.8**
China	**5.2**	4.0	2.0	6.0	**1.4**	3.7	8.7	6.0	6.0	**2.0**	6.0	5.0	6.0	4.0	**1.9**
South Korea	**6.2**	8.0	6.0	7.0	**2.4**	7.9	9.7	8.0	5.0	**2.3**	7.0	3.0	6.0	1.0	**1.5**

Source: SMMT / Frost & Sullivan (2019), Connected and Autonomous Vehicles: Winning the Global Race to Market.

But mobile network coverage on the UK road network remains wanting

Almost 5,540 miles (2%) of British roads have no 2G coverage from any network provider, whereas only 124,570 miles (51%) and 173,635 miles (71%) have full 4G and 3G coverage respectively.

	Miles (%) of road in Britain with…		
	Full network coverage	Partial network coverage	No network coverage
2G	195,797 (80%)	44,368 (18%)	**5,540 (2%)**
3G	**173,635 (71%)**	66,619 (27%)	5,452 (2%)
4G	**124,570 (51%)**	107,187 (44%)	13,948 (6%)

eCall is useless here

Note: percentages might not add up to 100% because of rounding. Partial network coverage means that at least one, but no more than three, of the four network providers – Vodafone, O2, EE, Three - offers a signal.

Source: RAC Foundation analysis using Ofcom data, Dec 2018.

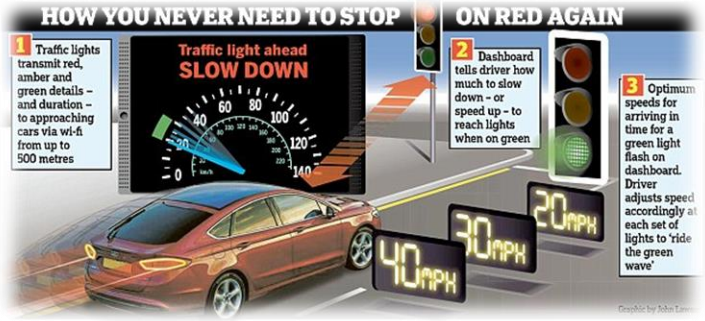
Future gazing: what next for vehicular connectivity?

The software defined vehicle

Over-the-air software update plays a fundamental role.

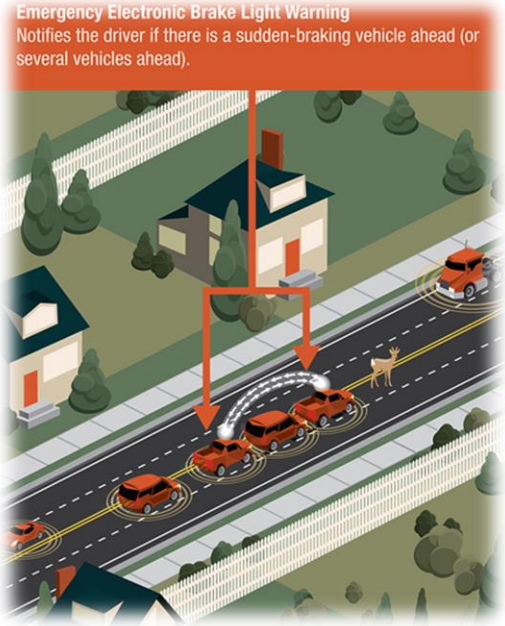
All images used are for illustration purposes only; other brands are available.

The next frontier – enabling V2V and V2I deployment

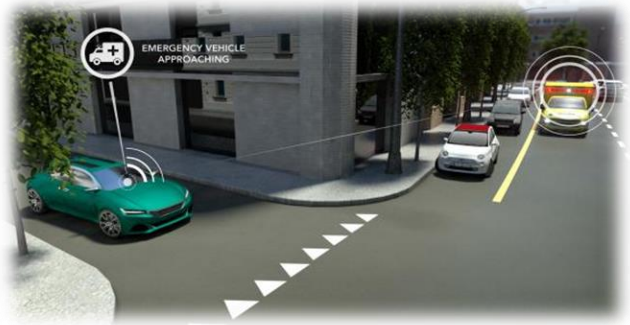


Green light optimal speed advisory

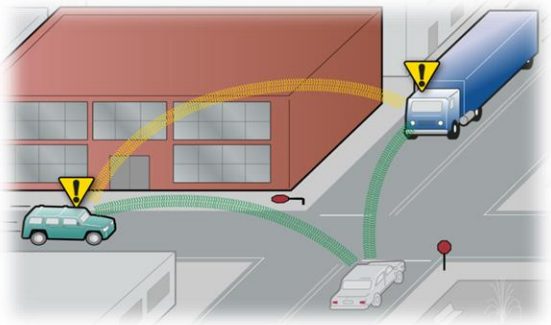
In-vehicle signage



Electronic emergency brake light

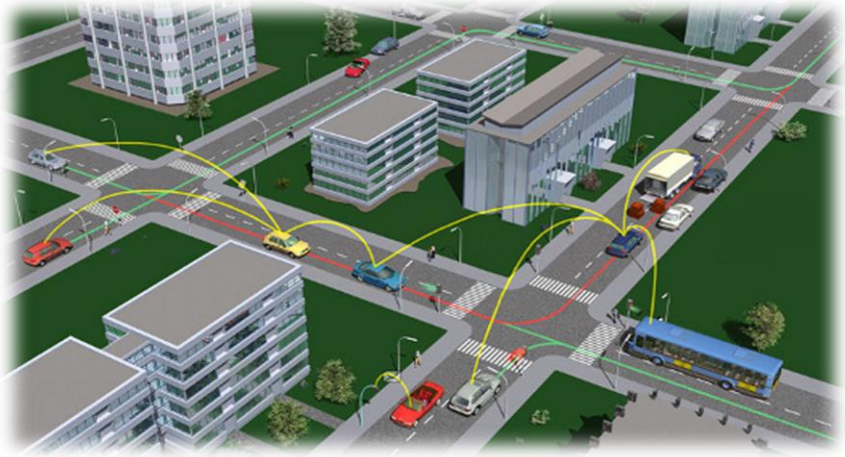


Emergency vehicle warning



Intersection collision warning

Short-range connectivity: shades of VHS vs Betamax?



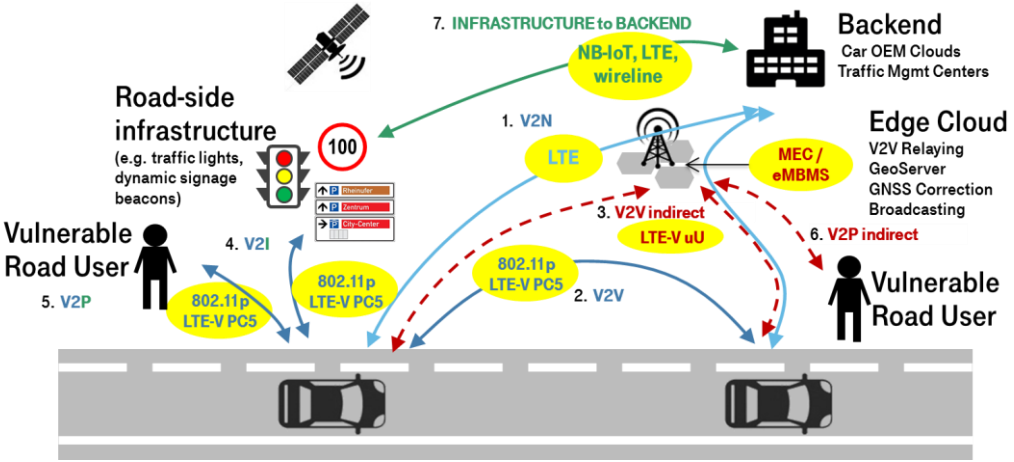


Illustration courtesy of 5G Automotive Association

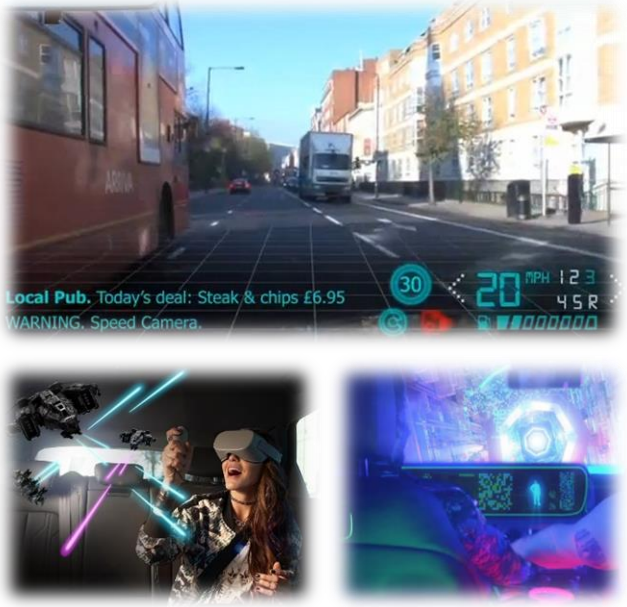
ITS-G5 (aka 802.11p, WAVE or DSRC)

Cellular V2X (LTE-V2X PC5, 5G-V2X)

Where then are the 5G use cases?

Connectivity complements automation and 5G presents potential opportunities in AR, VR and video-on-demand.

Illustration courtesy of Qualcomm



The potential impact of 2G/3G sunset

2G/3G switch-off: three key areas of potential impact to automotive

While 3G switch-off for the refarming of spectrum for 5G has long been expected, the potential ramifications of poorly planned 2G switch-off may be more damaging

eCall
both mandated and private
(pending NG-eCall development)

Some telematics and connected vehicle services
e.g. vehicle status report, driving data, online road assistance, stolen vehicle tracking, location/speed notification, remote lock/unlock, remote state of charge info, cabin pre-heating/cooling, fleet management telematics, navigation, tele-services

Smart metering and smart (managed) charging
e.g. pre-set charging window, signal response, pulse width modulation

Estimate of cars with non-eCall services that could be affected by 2025*

Cars with telematics, connected car and private SOS/bCall services that could be affected by 2G/3G sunset

	Up until 2020	2021	2022	2023	2024	2025
Estimate of new car registrations		1,890,000	2,130,000	2,250,000	2,300,000	2,300,000
Estimate of % new cars that are connected (with a SIM card or eSIM)		74%	79%	87%	89%	92%
Estimate of % of new connected cars with 2G/3G modules		75%	65%	55%	33%	10%
Estimate of cars affected	2,500,000	1,049,000	1,094,000	1,077,000	676,000	212,000
Estimate of cumulative cars affected	2,500,000	3,549,000	4,643,000	5,720,000	6,396,000	6,608,000

* These are illustrative and conservative estimates and are for the purpose of discussion; not official industry position.

Some key questions

- Will there be a sunset roadmap that provides sufficient clarity on milestones and that ensures there is no consumer detriment?

- The rollout of smart metres is already massively behind schedule. Will an upgrade, or replacement, be another expensive and complex exercise in the early 2030s? Who bears the costs? Will there be interruption to energy flexibility services and smart charging?

- Even if new cars migrate to NG-eCall based on LTE or VoLTE, PSAPs currently have little/no IP capability and will need hardware upgrade, which is a massive exercise. Is there a plan in place for this?

- Is there a contingency plan for a basic 'safety net' for legacy devices, e.g. a stripped-back (minimalist) 2G network, or national wholesale 2G roaming network?

Thank you

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