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# Trends in Audio and Radio Consumption in the UK

Jack Wetherill, Mike Fisher,
Simon Forrest & Alex Jornod

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# INTRODUCTION

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- The way in which people purchase and consume audio-visual entertainment is changing rapidly
- Developments in technology, particularly streaming via the internet, are fuelling new possibilities which enable consumers to obtain and enjoy content whenever and wherever they like
- Packaged physical media is giving way to digital consumption, in an environment where people increasingly seek experiences which are on-demand and personalised.
- In this rapidly changing environment, radio has successfully retained most of its reach, defined by RAJAR as the % of the population aged 15+ that tunes in for at least 5 minutes per week
  - Reach was 87% in Q4 2019, just three percentage points lower than seven years before.
    - However this erosion has occurred since 2017 and the radio industry is keenly aware that it must innovate in order to continue to remain at the centre of the UK's entertainment landscape.
- This report was commissioned on behalf of the Digital Radio Audio Review to ascertain the current state of the UK entertainment markets and examine the technology landscape and the changing methods of audio consumption, in addition to providing forecasts and recommendations for the future of audio and radio consumption within the UK.

# RELATED REPORTS

- Perspective on Key Audio Trends in 2020 - December 2019
- Voice Assistants in the Home - December 2019
- Worldwide Home Audio Market Report, December 2019
- The Future Role of Automotive Audio, September 2019
- Futuresource Streaming Music Outlook - August 2019
- Audio Tech Lifestyles Consumer Survey – June 2019
- For more information, contact the author or visit our website at https://www.futuresource-consulting.com/

# EXECUTIVE SUMMARY

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- The way in which UK consumers acquire and enjoy entertainment content is in a period of rapid change.
  - The switch from physical packaged media to digital is well under way in the UK, with just 18% of consumer spend being devoted to CDs, DVD, Blu-rays, vinyl and physical computer games this year, down from 33% in 2018.
- The way in which music is consumed has been transformed by the introduction of streaming services from the likes of Spotify, Apple and Amazon, resulting in 74% of consumer spend being devoted to digital in 2018, a share that is forecast to rise to 93% by 2023.
- Subscriptions to music streaming services grew by 24% last year and are on track to reach 36% of the population by 2023.
  - The major players (Amazon, Google, Spotify and Apple) are intensifying their efforts to capture a greater share of the audio market, increasingly bringing personalisation, audio books and podcasts to their offering.
    - They are introducing radio-like experiences on their platforms to expand the adoption of streaming to older demographics and offer an alternative to radio, which integrates a blend of convenience, on-demand content and lean-back listening.
- Automotive is viewed as the next frontier for a richer entertainment experience as the car industry enters a period of substantial change involving electrification of vehicles and a push towards assisted and, ultimately, autonomous driving, requiring vehicles to become increasingly connected.
  - Broadcast radio will continue to be standard fit in new vehicles for the foreseeable future, 100% digital from 2020.
  - However, the dashboard will be transformed to become an expanse of screens that permits infotainment systems to become full entertainment hubs, with audio and radio now competing against video and other visual content. In this world, radio is highly likely to become an "app" on the dashboard, vying for attention amidst a wider range of entertainment options.
  - The introduction of Smartphone mirroring solutions has also hastened drivers' ability to consume content direct from the cloud
    - Over 13m cars will be on the road in five years' time with smartphone mirroring, in addition to 5m vehicles with in-built 4G/5G which is being used for infotainment.
- In response to these competing pressures, the radio industry is exploring ways to make its service more attractive, with radio via IP permitting innovation and the opportunity to enhance the consumer experience.
  - Hybrid radio delivery conveys valuable metadata that could be used in a variety of ways is seen as offering the best of both worlds, capable of switching between analogue.

# EXECUTIVE SUMMARY

- Analogue radio services remain an important consideration, still accounting for 41% of UK radio listening hours.
  - Analogue radio licences are approaching expiry in 2022 and, with no confirmed date for digital switchover, the government must decide whether to continue with the current arrangement of licence renewals in order to extend analogue radio broadcasting, or otherwise embark upon the transition to digital.
  - DCMS launched a consultation on the further renewal of analogue commercial radio licences in December 2019. The outcome has yet to be published but is likely to indicate continued support for analogue broadcast until at least 2027.
- Meanwhile, uncertainty remains on timescales for a wholesale transition to DAB/DAB+ services, and the delay in setting a date for switch over is affording opportunity for alternative broadcast strategies based around IP.
  - Broadcasters are well-aware that an IP-based delivery model presents both a challenge and an opportunity.
  - A delayed analogue radio switch makes a transition to 5G broadcast more likely. Indeed, broadcast applications were considered an integral part of 5G systems from the very beginning, and the specification for high power high tower (HPHT) 5G is very robust.
  - Given the momentum behind 5G for both mobile and fixed-wireless broadband, alongside the opportunity for television broadcast over 5G, it looks likely that digital radio services will eventually take advantage of the same infrastructure. Trials of broadcast television and radio services over 5G infrastructure are showing positive results. Indeed, in the next decade, 5G broadcast appears to be an entirely viable option, with mixed-mode operation being especially favourable to manage bandwidth.

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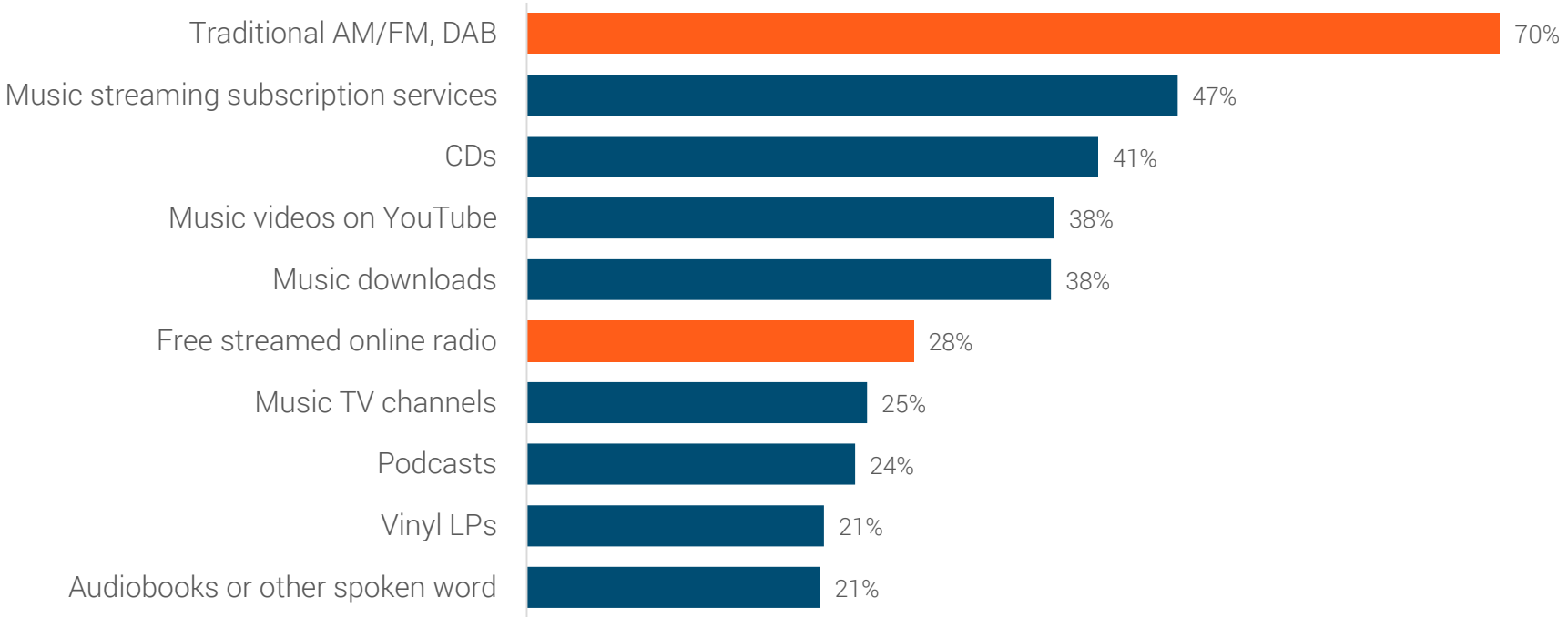
## Radio remains the single most popular way to listen to audio

- 70% of respondents to the Futuresource survey stated that broadcast radio was their preferred means of listening to audio content, with a further 28% of people claiming to listen online.
  - Many of those who stream online radio also rely on broadcast, particularly in the car.
- Music subscription services are a fast growing area whilst YouTube videos are another major source for music lovers.

% of All Respondents who Listen to the Following Audio Types for at Least One Hour a Week

*Base: All 2,096 Respondents, UK**




** Source: Futuresource Audio Tech Lifestyles, June 2019. The survey covered owners of Headphones and/or Soundbars.*

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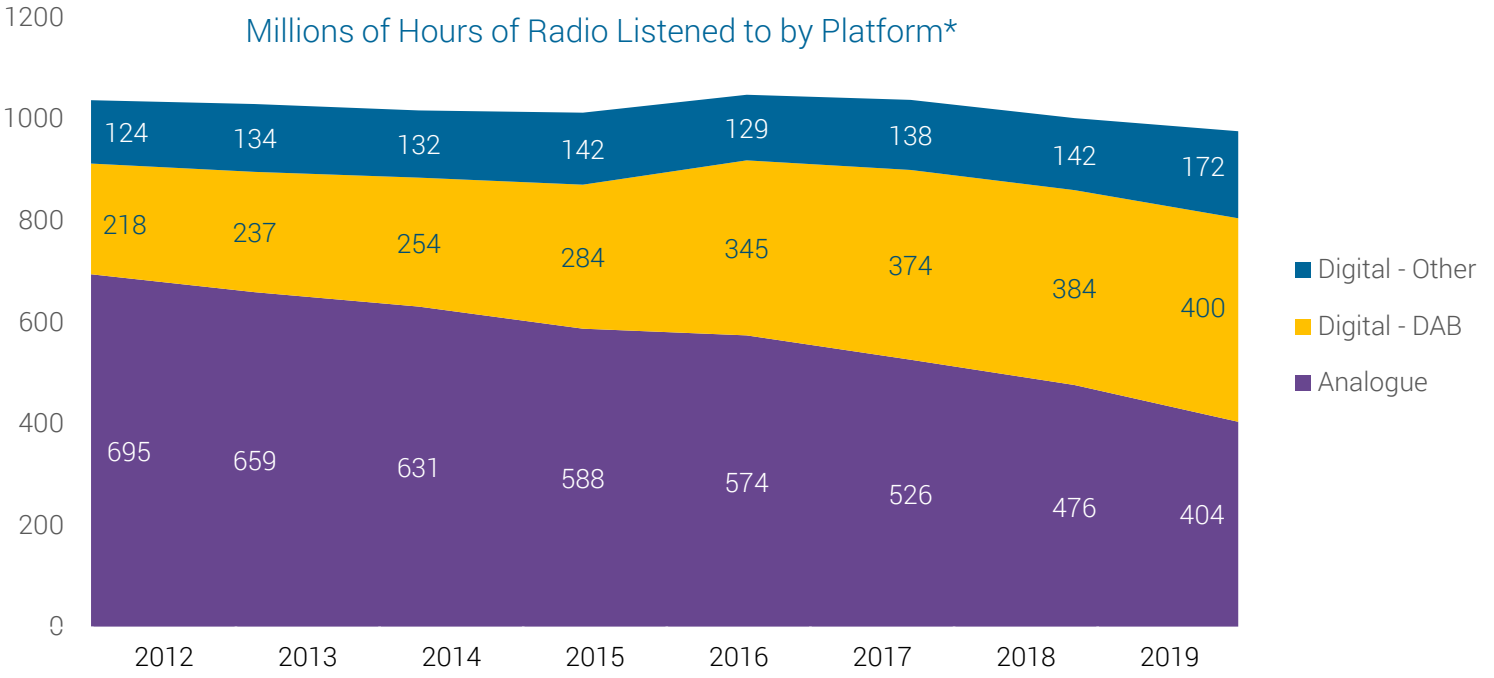
# EXECUTIVE SUMMARY

## 59% of radio listening is now on digital

- The shift from analogue is relentless, but there is still some way to go.
  - Digital listening reportedly accounts for 59% of the total hours of radio consumed (both in and out of the home) of which DAB is responsible for 70%, digital TVs 8% and computers/tablets/smartphones/smart speakers the remainder.
  - This leaves 41% of radio still being consumed on FM/AM/LW devices.




| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|
| Digital - Other | 12% | 13% | 13% | 14% | 12% | 13% | 14% | 18% |
| Digital - DAB | 21% | 23% | 25% | 28% | 33% | 36% | 38% | 41% |
| Analogue | 67% | 64% | 62% | 58% | 55% | 51% | 48% | 41% |

** Source: Futuresource analysis of RAJAR data. Each data point refers to Q4, average hours listened per month in that quarter*

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# TECHNOLOGY AND SPECTRUM DEVELOPMENT

# STATUS OF DIGITAL RADIO BROADCASTING

- In 2010, the Department for Culture, Media & Sport (DCMS) brought the radio broadcasting industry together to develop the Digital Radio Action Plan. Since then, the government's strategy has been to support development of a national DAB network, which today is used weekly by around two-thirds of the adult population, according to audience statistics released by RAJAR.

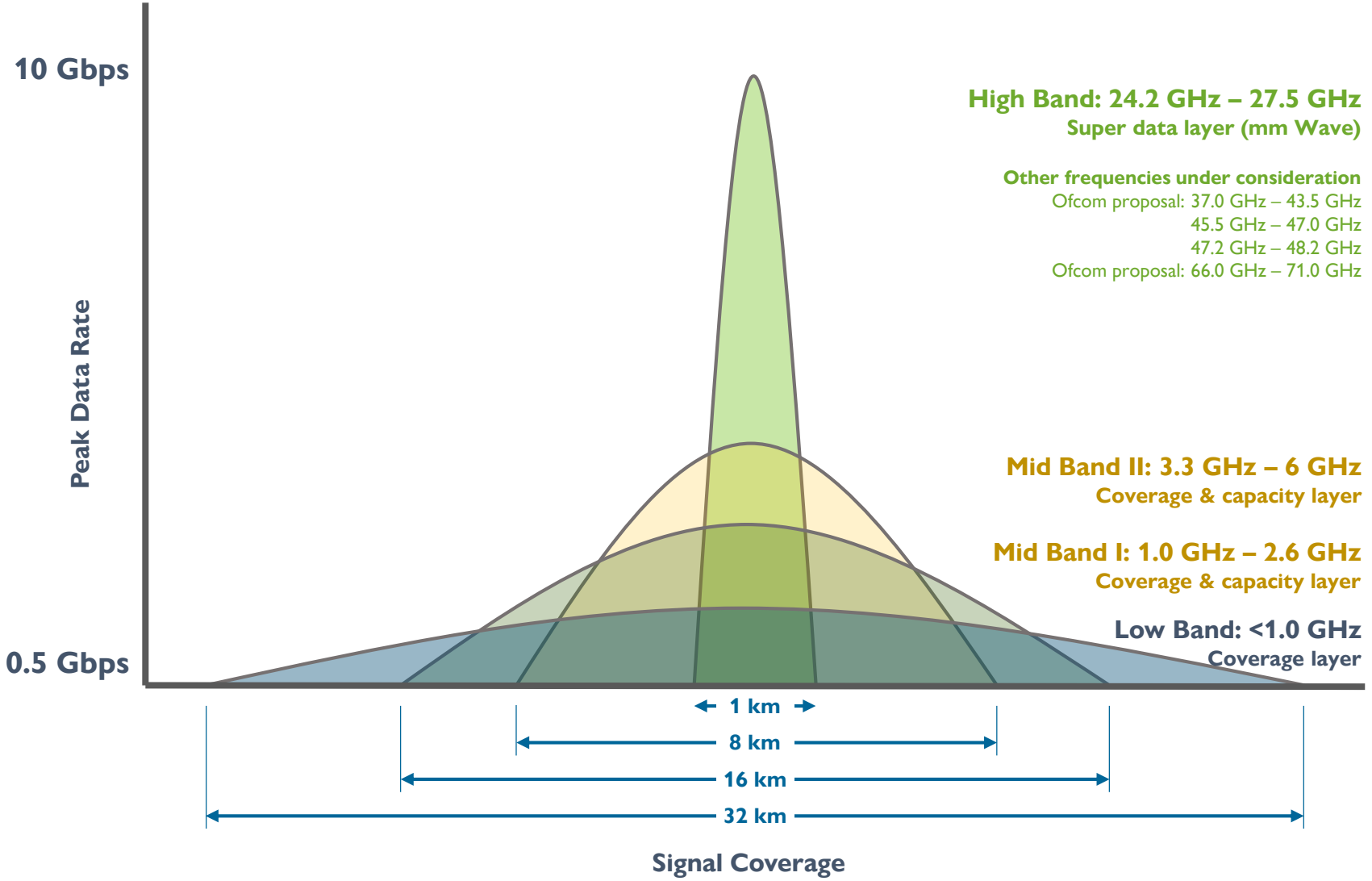
- Continued improvements in national and local digital radio coverage alongside investment in new digital services by broadcasters, coupled with vehicle manufacturers now fitting digital radios as standard in new cars (95% in Q4 2019), has supported broad uptake of digital radio across the UK.
  - Digital overall now accounts for 59% of all radio listening (RAJAR Q4 2019), up from just 24% in 2010.
- Last year, the UK government consulted on plans to implement the EU Directive (EECC) mandating the installation of broadcast digital radio in new cars. Assuming the Directive is passed into UK law in 2020, in line with other EU countries, manufacturers of the final 5% of new cars will be required to fit digital radio as standard.
  - In vehicles, digital radio listening now stands at 45% and is expected to surpass 50% in the next year.
- Meanwhile, analogue radio services remain an important consideration, still accounting for 41% of UK radio listening hours. Several FM and AM radio licences are approaching expiry in 2022 and, with no confirmed date for digital switchover, the government must now decide whether to continue with the current arrangement of licence renewals in order to extend analogue radio broadcasting.
  - DCMS launched a consultation on the further renewal of analogue commercial radio licences in December 2019; the consultation period ended on 21st February 2020. The results are likely to indicate continued support for analogue broadcast to at least 2027.
  - The consultation also considered the launch of new ultra-local small-scale multiplexes, which media regulator Ofcom is planning to license in the U.K. later in 2020. This presents opportunity for some local commercial stations to satisfy their DAB carriage obligations through distribution on new small-scale multiplexes.
- It is apparent that the UK government intends to continue supporting the development of the radio industry, but uncertainty remains on timescales for a wholesale transition to DAB. Meantime, the delay in setting a date for switch over is affording opportunity for alternative broadcast strategies based around IP. Recent trials using 4G mixed-mode broadcasting (eMBMS) over the 700 MHz spectrum confirm the feasibility of delivering radio services over mobile internet; and the potential for 5G high-power high-tower (HPHT) FeMBMS broadcasting looks set to increase the opportunity for IP still further.

# 5G DEPLOYMENT ACTIVITY

- The roll-out of 5G across Europe is progressing in line with EU objectives. The process has accelerated as operators began commercial roll-out of network infrastructure in 2018 alongside mobile handset vendors launching smartphones with 5G modems last year.
  - The European Commission's 5G Action Plan set aggressive targets in 2016. This calls for 5G deployment in at least one major city in every member state by the end of 2020, plus uninterrupted coverage across all urban areas and major terrestrial transport corridors by 2025.
- UK mobile spectrum auctions continue, with each of the four main operators competitively bidding for licensed frequencies. So far, spectrum with a reserve price of £70m has been acquired for a total consideration of £1.3bn.
  - Following the clearance of the 700 MHz spectrum previously utilised by digital terrestrial television, 80 MHz of this frequency band is scheduled for auction in spring 2020. This enables operators to expand the reach of mobile services.
    - Ofcom originally intended to impose a coverage obligation on the 700 MHz band, which would have required winning operators to extend outdoor data coverage (both 4G and 5G services) to at least 90% of the UK's entire land area within four years of the award, in return for discounts.
    - The new £1bn Shared Rural Network (SRN) will replace the original proposal through the sharing of existing mobile towers, plus collaboration between operators on new towers erected to cover poorly served areas. The SRN should result in each individual operator achieving 92% geographic coverage by 2025, with licence obligations taking effect in 2026. The collective effect of this will deliver mobile services to 95% of the UK.
  - For the 5G coverage and capacity layer, 150 MHz of the mid-band (3.4 GHz to 3.6 GHz) spectrum was assigned to operators in April 2018. This delivers a 5G network with a balance between performance and wide area coverage.
    - Ofcom are expected to auction an additional 120MHz in the 3.6 GHz to 3.8 GHz frequency range in May 2020.
  - For the high-band, high capacity mmWave frequencies, local licences for 26 GHz spectrum are available on demand subject to coordination, with test licences awarded in 2019.
    - Presently there is no clear market demand for mmWave in the UK, as operators' initial focus is on expanding coverage for 5G services. The award of 26 GHz spectrum to operators is not expected to happen until at least 2021.
- Densification of mobile networks remains a key challenge to guaranteeing 5G coverage. Meantime 4G LTE is sufficient for radio.

# 5G RADIO FREQUENCIES AND COVERAGE

## Three primary frequency bands will be used for commercial 5G services

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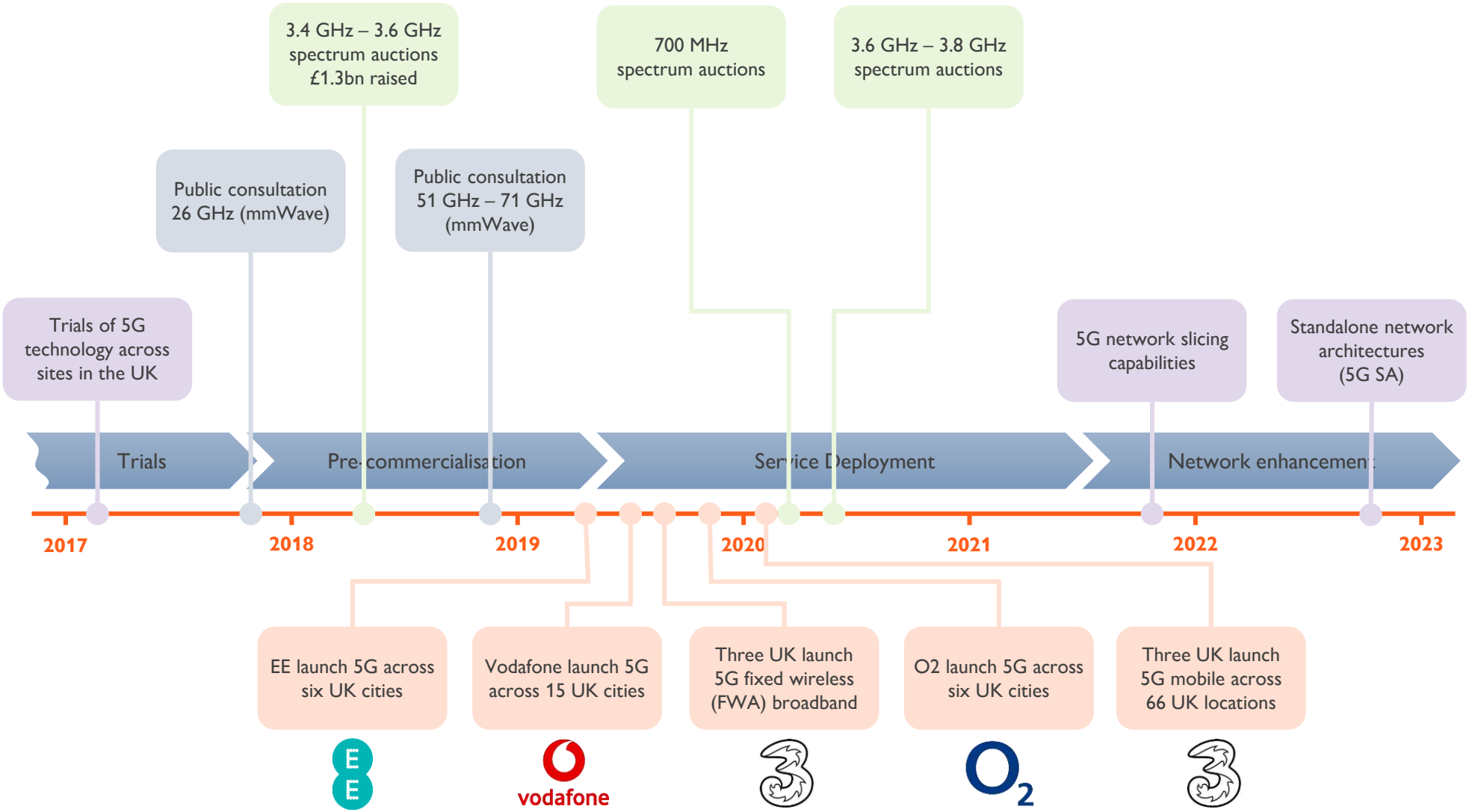
# UK 5G TIMELINE

## All four UK mobile operators launched 5G in 2019; the race is now on to extend networks

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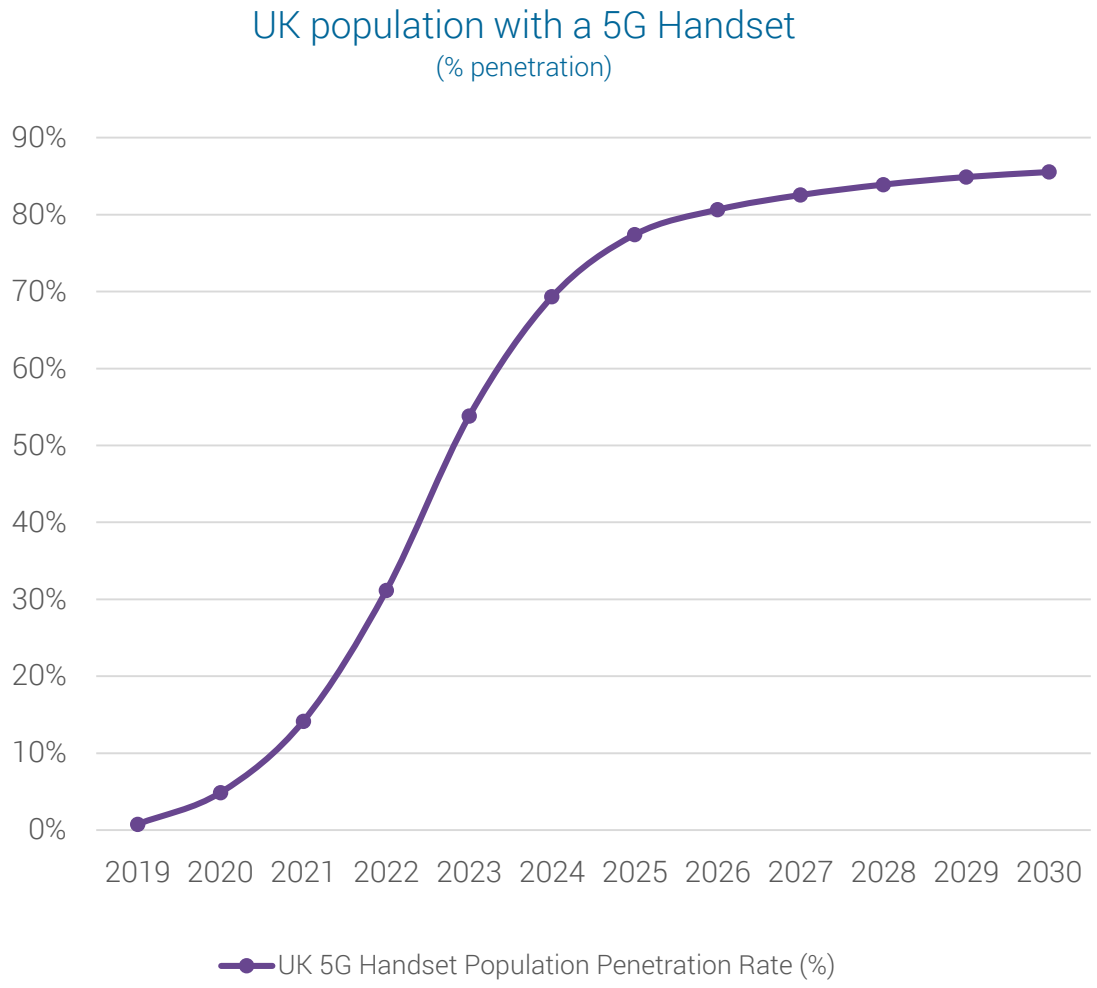
# 5G MOBILE: HANDSET PENETRATION IN THE UK

## 5G will enable even greater consumption of media




### 5G by Numbers

- In 2020, 2.9 million 5G handsets will be shipped in the UK, extending the installed base to a modest 3.3 million units.
- By 2030, Futuresource estimates there will be around 59.7 million 5G handsets in active usage across the UK.
  - This equates to just under 86% of the UK population, up from only 5% in 2020.

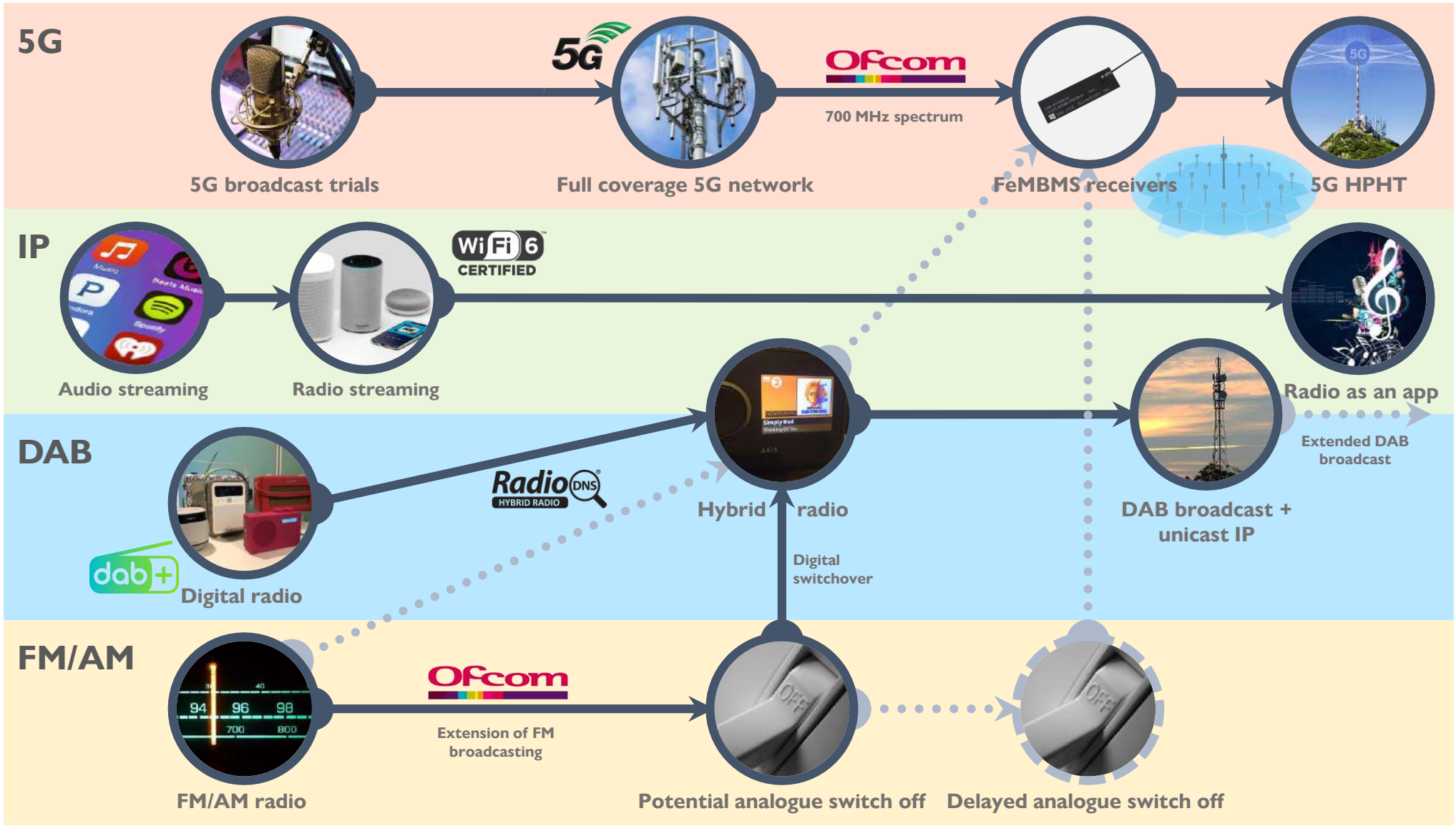
### Network Development

- 5G networks will mature significantly across the forecast period, enabling faster speed, lower latency and ubiquitous access.
  - UK mobile operators are concentrating on building network coverage initially, before enabling faster, up to 10Gbps, speeds through network densification.
- A full suite of media and entertainment services will be delivered to mobile and fixed wireless devices.
- Media streaming services, including radio, are likely to become prolific, as network availability improves and data costs continue to fall.

# IS DAB UNDER THREAT FROM IP?

- Broadcasters understand that IP-based [internet or mobile] delivery presents both a challenge and an opportunity. There is growing consensus that a transition to an all-IP world is feasible.
- In January 2019, Arqiva published results of its own research into whether 4G could present a viable alternative to DAB.
  - 4G matched DAB for broadcast quality across the UK's motorway network and drew around 60 Kbytes of data per second. For the average 20-hour-per-week listener, this equates to around 1GB of extra data usage per month.
    - This may seem prohibitive, however data from Ofcom states that 70% of mobile tariffs now include over 5 GB of data per month, yet only 10% of mobile data consumers routinely use more than this; and this is despite average mobile data usage increasing 146% since 2016.
  - There is also the issue of capacity. Arqiva found that 4G is perfectly capable of delivering radio services, but only on a lightly loaded 4G network. In traffic jams or areas where lots of vehicles are passing through, the user experience can be greatly reduced.
    - This would be resolved with 5G, which significantly expands the number of simultaneous users, and offers further potential to employ 5G network slicing to provide guaranteed bandwidth for radio services, once this feature becomes available (widely expected to be from 2022 onwards). The challenge with 5G currently is that coverage is presently limited.
- Throughout 2019, the BBC ran their own trials using 5G for radio broadcast services as part of "5G RuralFirst" (www.5gruralfirst.org), a UK government-funded initiative to experiment with new approaches to connectivity in rural areas.
  - A base station using 4G technology (but designed to emulate 5G) provided engineers with full control over transmission parameters, including modulation and coding settings. The trial used 2×10 MHz bandwidth in the 700 MHz band, using broadcast-mode delivery of radio over 4G (eMBMS with MPEG-DASH), enriched by mobile broadband to give listeners access to live (broadcast) and catch-up (unicast) content.
  - The trials were successful with average broadcast listening measured at just over two hours per day, the equivalent of around 1.5 GB of data per month in the conventional unicast scenario. Broadcast mode saves bandwidth, since the base station only sends a single stream of content rather than multiple versions.
  - Overall the results showed that 5G broadcast is an entirely feasible option for radio services, with mixed-mode operation being especially favourable to manage bandwidth. With 5G HPHT (high-power high tower) also being trialled in Germany for digital TV services, the combination of 5G TV and radio across both mobile and fixed-wireless broadband is showing early signs of success.

# PATHWAYS TO THE FUTURE OF RADIO (1 of 2)



# PATHWAYS TO THE FUTURE OF RADIO (2 of 2)

## The future of radio is digital, but there are alternatives to DAB

### Analogue radio

- FM and AM radio licences will need to be renewed from 2022. With no confirmed date for digital switch over in the UK, it is likely that analogue broadcast will continue until at least 2027.

### Digital radio (DAB)

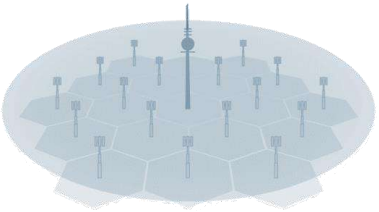
- Digital radio broadcasting is strong in the UK, with around 500 transmitters carrying commercial DAB and DAB+ services.
- DAB uses low bit-rate MPEG 1 Layer 2 encoding for audio. Improved audio quality is provided by DAB+, which employs the far more efficient HE-AAC encoding. But although receivers marked with the "Digital Radio" tick accreditation must support DAB+ – a requirement since 2013 – and it's used for newer services, there is presently no mandate for a wholesale switch over to DAB+.
- There are no plans to improve upon DAB+ with a new standard. Broadcast of DAB/DAB+ is highly likely to continue beyond 2030.

### Internet Protocol (IP)

- The Internet presents both an opportunity and a threat to digital radio. Smartphone apps including TuneIn Radio, Radioplayer and BBC Sounds, offer the audience a convenient way of receiving radio services.
- Radio services are now available by direct access via Smart Speakers. This is steadily extending to soundbars.

### 5G

- A delayed analogue radio switch off beyond 2027 makes a transition to 5G broadcast more likely. Indeed, broadcast applications were considered an integral part of 5G systems from the very beginning.
  - Trials of digital television broadcast over 5G high power high tower (HPHT) infrastructure in Germany occurred throughout 2019, using the new broadcast mode FeMBMS (Further evolved Multimedia Broadcast Multicast Service) covering a radius of up to 60 kilometres.

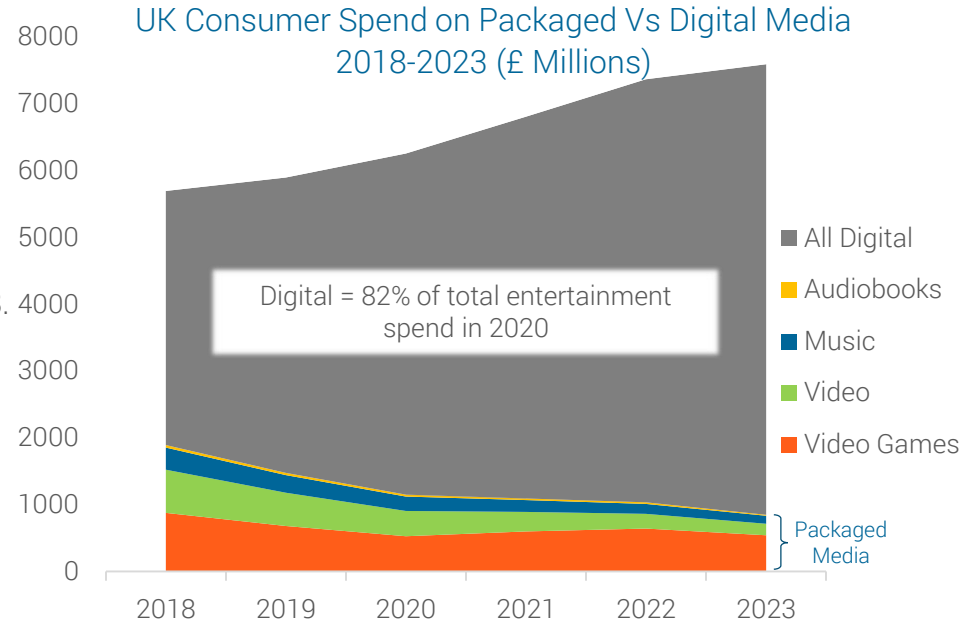


- Given the momentum behind 5G for both mobile and fixed-wireless broadband, along with the propensity for mixed-mode broadcast operations over 5G HPHT, it looks likely that digital radio services will take advantage of the same infrastructure. Additionally, densification of 5G cell infrastructure will enable ultra-local services to proliferate, allowing radio to follow the listener.

# MEDIA CONSUMPTION TRENDS

# CONSUMER SPEND ON PACKAGED MEDIA IN SWIFT DECLINE

- The switch from physical packaged media to digital is well under way in the UK, with just 18% of consumer spend being devoted to it this year, down from 33% in 2018.
- Consumer spend on packaged media in the UK totalled £1.5 billion in 2019. As the transition to digital media accelerates, Futuresource forecasts consumer spend on packaged media in the UK to experience a steep decline to £0.8 billion in 2023, a 55% drop on 2018.
- Digital content platforms are progressively substituting packaged media. This trend is particularly strong for video, music and audiobooks, which are all being replaced by digital formats either in the form of streaming subscriptions or transactional digital products.
  - Audio and video streaming players such as Netflix, Amazon, Spotify and Apple have been heavily investing to drive mainstream adoption of their services in the UK. As a result, streaming uptake has been particularly strong, with consumers favouring this type of consumption, seen as more convenient, integrating better with their devices and lifestyle, while offering a better value for money.

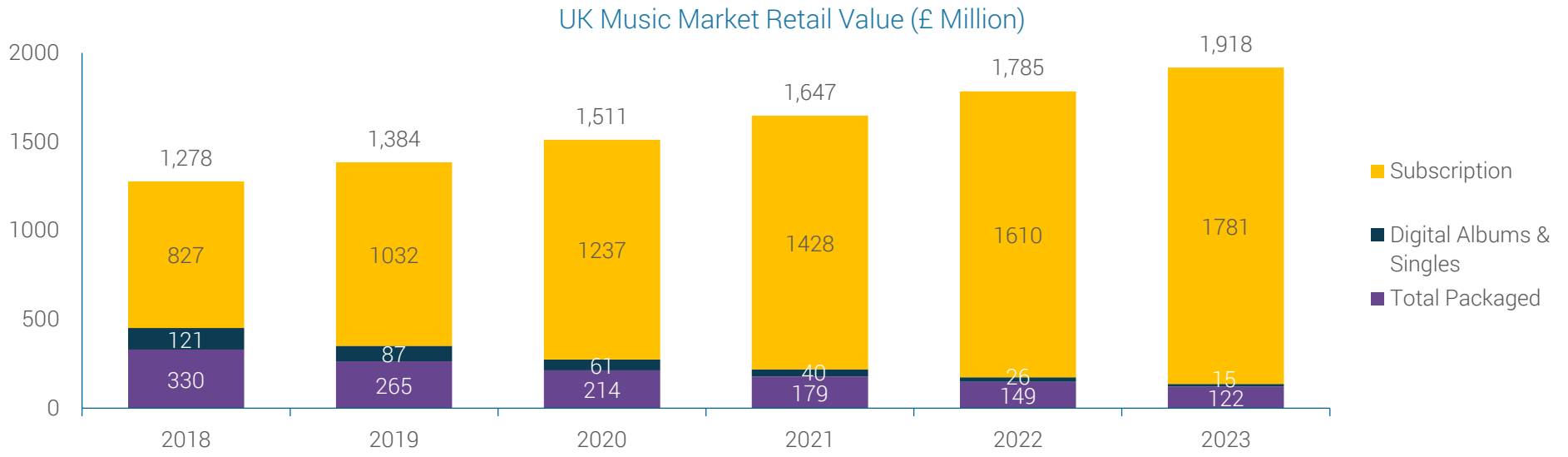



- Video games have been slower to transition away from physical media distribution than other forms of entertainment. In 2019, UK consumers spent £679 million on packaged video games, 54% of overall spend.
  - A primary cause of this resilience is the bundling of physical media with the purchase of new consoles at retail. As retailers stockpile new hardware in anticipation of the launch of the next generation of consoles in Q4 2020, a spike in demand for physical discs from retailers will cause a boost in volume of physical games sold during the end of 2020 and throughout 2021.
  - Other factors include the gifting of physical games during holiday season, along with packaged games retaining a certain level of resell value, which is an incentive for users to purchase packaged games as opposed to downloading them.
- Ultimately, Futuresource expects packaged video games to follow a similar trend as for audio and video and be replaced by digital formats. In 2023, consumer spend on packaged video games is expected to decline to £543 million.

# MUSIC MARKET DEVELOPMENT

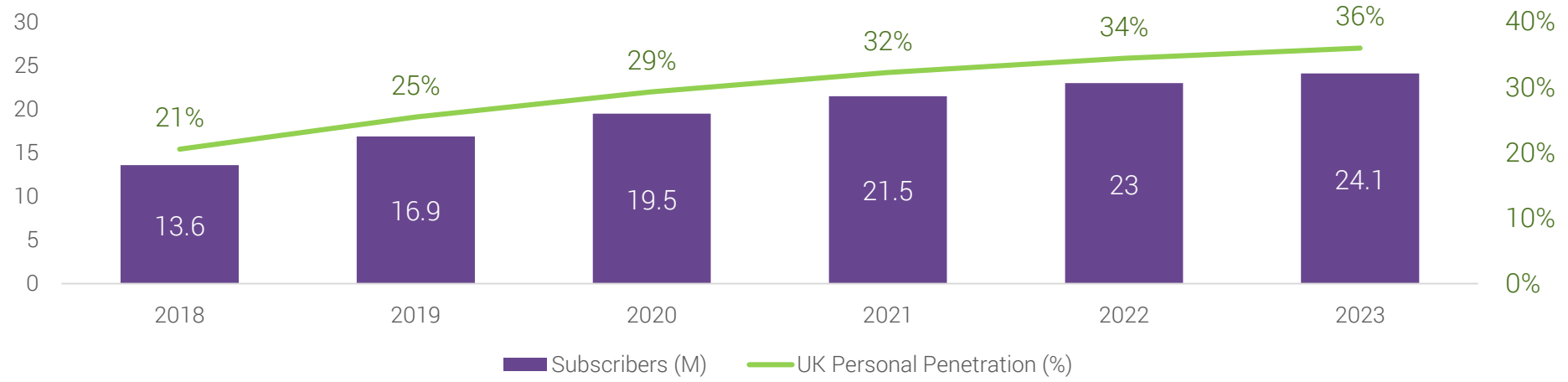
## Streaming uptake driving growth

- The UK music market in 2019 was once again fuelled by the continuous adoption of streaming subscriptions, with 8% growth in total consumer spend reaching £1.4 billion. Streaming subscriptions accounted for three-quarters of the total consumer spend on music in 2019, with this share expected to keep growing at a healthy rate until 2023.
- As the domination of on-demand streaming intensifies, digital downloads of albums and singles are being the most impacted, being directly substituted by streaming subscriptions. Consumer spend on digital downloads decreased 28% in 2019 to £87m. By 2023, digital albums and singles are forecast to represent less than 1% of the total consumer spend on music in the UK, accounting for £15m, an 87% drop since 2018.
- In the same way, physical products are also slowly being replaced by streaming subscriptions, decreasing 20% in 2019 to £265 million. The overall decline of packaged music is however set to be slower than for downloads thanks to resurgence of vinyl, which is expected to see its peak in 2020 after some recent years of consistent growth, reaching £78m, but then predicted to progressively drop to £58m in 2023.
  - Consumer spend on CD decreased 27% in 2019 to £180m with this decline forecast to further intensify until 2023 to reach £39m.

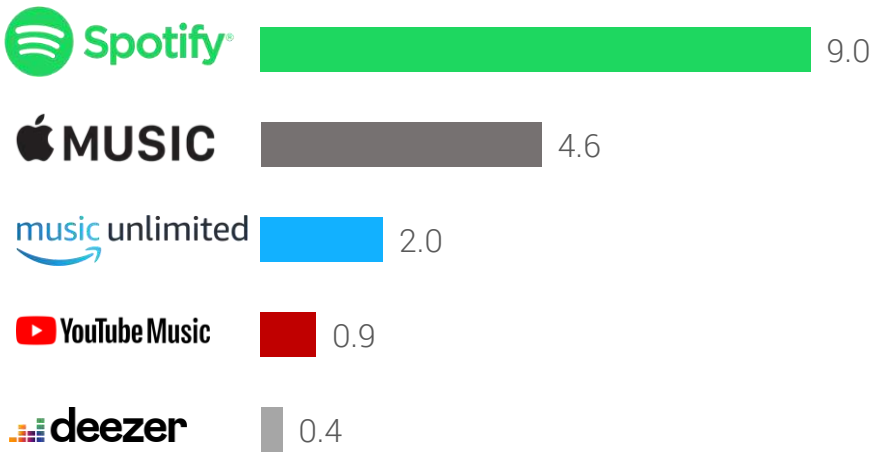


# MUSIC STREAMING SUBSCRIBERS OUTLOOK

UK Music Streaming Subscribers Outlook (M) & Population penetration (%)




2019 UK Paid-for subscribers per service. est. (M)




- In 2019, the number of UK streaming subscribers grew 24% to reach 16.9 million, equivalent to 25% of the population.
  - After years of tremendous growth (36% in 2018, 50% in 2017 and 2016), streaming adoption is expected to slow down as the UK market matures.
- In 2023, Futuresource forecasts the number of streaming subscribers to reach 36% of the UK population, which corresponds to 24.1 million subscribers.
- While Spotify remains the leading streaming player in the UK with an estimated 9 million subscribers at the end of 2019, Apple Music and Amazon are catching up notably thanks to their hardware installed base.
  - YouTube Music, after a 2018 re-launch and strong marketing push is also experiencing important growth, making the competition in the UK streaming market more intense than ever.

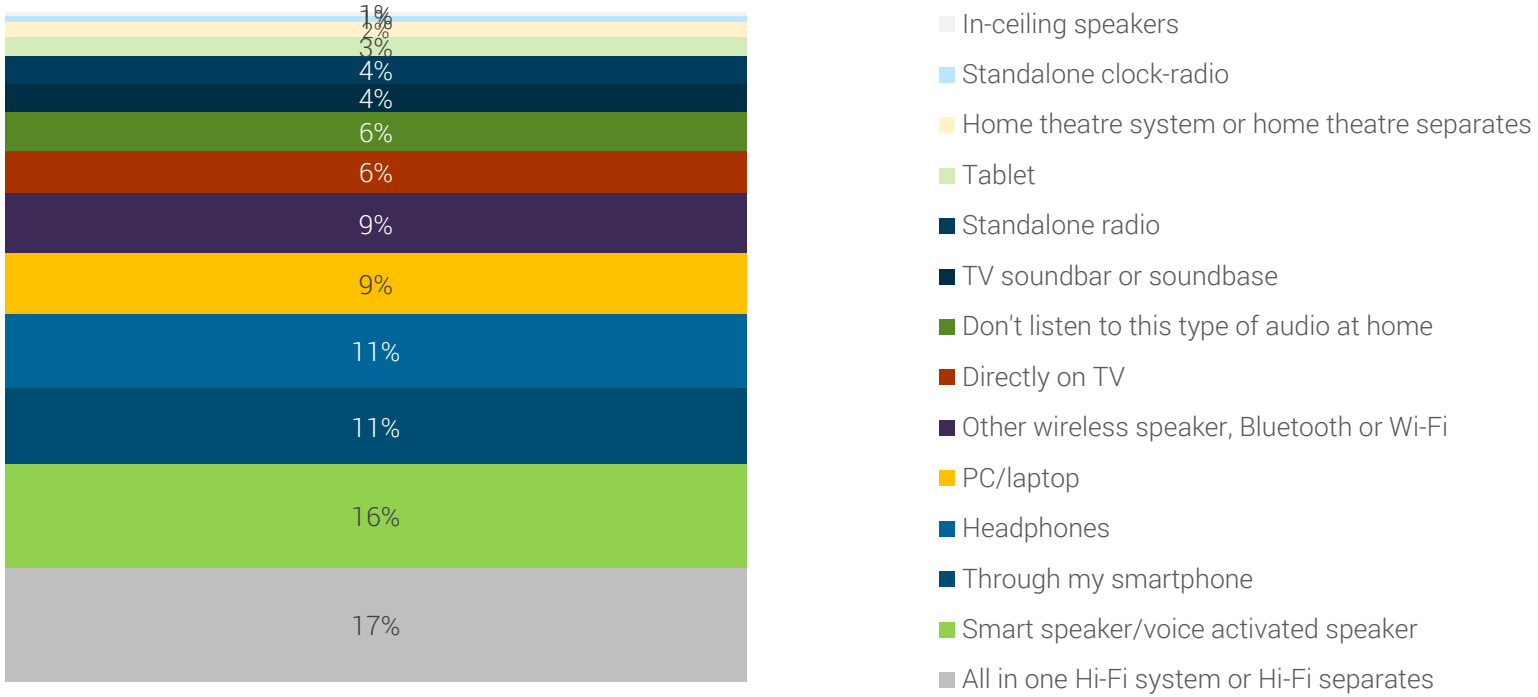
# MUSIC LISTENING IN THE HOME

## Smart speakers soon to become the most popular option for enjoying music

- 16% of respondents to Futuresource's Audio Tech Lifestyles consumer research last year claimed that their most used device for listening to music was their Smart Speaker
  - 5% claimed that standalone radio was their favoured option, although some of the 11% who claimed to be listening through headphones could also conceivably be using a radio as the source device.

### Device Used Most Often for Listening to Music at Home

*Base: 4,380 respondents in the UK**




** Source: Futuresource Audio Tech Lifestyles, June 2019. The survey covered owners of Headphones and/or Soundbars.*

# SPOTIFY: OVERVIEW AND STRATEGY

## Audio first strategy – focus on podcasts

- Spotify has acquired 4 podcast companies since the beginning of 2019 (Gimlet, Parcast, Anchor and more recently the Ringer), reinforcing its ambition to become the leading player in the podcast market. It has also signed exclusive partnerships to host podcasts from notably President Barack Obama & Michelle Obama, along with multiple other influential podcast presenters and personalities in order to strengthen its offering with exclusive content.
  - To better highlight its podcast content, Spotify has released an updated version of its mobile app, allowing easier access to podcasts. It also launched a podcast discovery playlist called Your Daily Podcasts.
- Non-music content represents a significant opportunity for Spotify to attract more users but also improve its margins. Podcasts are not currently licensed by Spotify, which means that the company doesn't pay podcast producers a share of its revenues every time a user listens to a podcast.
  - Through its newly launched Streaming Ad Insertion (SAI) technology, Spotify plans on offering improved and more targeted ads on podcasts, while enabling in-depth podcast audience insights for advertisers; ultimately increasing podcast monetisation opportunities and the value of its ad inventory.
- As the market evolves and Spotify's podcast market share increases, the company aims at replicating a similar strategy as Netflix with original and exclusive content on its platform.
- Apple still leads the podcast ecosystem in the UK with over 50% of podcasts listeners, but Spotify, with its investments in original podcasts, is going head-to-head with Apple in this sector, capitalising on the growing consumer interest for on-demand spoken-word content.

| Strengths | Weaknesses |
|---|---|
| Leading position / Established user base / Strong brand loyalty (just 4.6% churn) | Relies exclusively on its streaming operations to be financial sustainable |
| Considered best-in-class UI by many / Powerful recommendation technology | No hardware /depends on other hardware partnerships (notably from Apple and Amazon) |
| Widely supported and accessible | Heavily dependent on music rights-holder licensing agreements |
| **Opportunities** | **Threats** |
| As Spotify reach increases, more opportunities for exclusive content | Fierce competition for time and attention between multiple media and players |
| Podcast production and consumption uptake | Low flexibility to compete with aggressive price and promotions from competitors |
| Streaming services increasingly supported in cars | Subscriber growth slowing down in the UK |

# APPLE MUSIC: OVERVIEW AND STRATEGY

## Blending on-demand streaming and radio

- Apple has been consistently focusing on human curation to differentiate from the competition. Through both its streaming playlists and online radio Beats 1, Apple Music has put humans at the core of its offering with a strong emphasis on artists and curators on the platform.
- Apple Music has continued its effort in developing its free online radio Beats 1 through partnerships with popular artists such as Frank Ocean, Nicki Minaj, Pharrell Williams and Elton John to host shows on Beats 1.
  - Even though Apple Music and Beats 1 are separate entities, they both live within the same app and have obvious synergies, which helps grow Apple Music's subscriber base by attracting and retaining listeners within the Apple Music app and Apple's ecosystem.
- In addition, Apple recently launched a dedicated podcast app in replacement of its multi-media app iTunes. The company is planning on investing in original and exclusive podcasts to follow Spotify's move into the podcast business while also attracting more radio-listeners to its Podcast app.
- Through its in-car entertainment technology, CarPlay, Apple allows iPhone users to seamlessly consume music through Apple Music in their cars, while also being able to control the app using voice with its voice assistant Siri. There is an estimated 40 million cars fitted with CarPlay globally, providing a significant opportunity for Apple Music and Beats 1 to further establish in cars.

| Strengths | Weaknesses |
|---|---|
| Apple Music integration into Apple's extensive eco-system of products and services | Stronger focus on human curation than on algorithmic personalisation |
| Involvement of high profile artists and curators / Strong reputation in R&B genre | No free, ad-supported tier |
| Full standalone free radio with Beats 1 | Heavily reliant on the performance of Apple's hardware products / Low penetration within Android user base |
| **Opportunities** | **Threats** |
| iPhones and other Apple products installed base continues to grow / Adoption of voice assistants accelerating, including Siri | Fierce competition in both streaming and hardware markets |
| Increasing number of cars fitted with Apple CarPlay | Cheaper streaming plans, notably from Amazon |
| Strong presence in the UK, potential bundling with its other services e.g. Apple TV+ | Not preferred service partner of choice for hardware manufacturers |

# AMAZON MUSIC OVERVIEW AND STRATEGY

## Serving every segment of the market and leveraging its Echo speaker range

- To appeal to the widest audience, Amazon has launched a multitude of streaming plans and at different price points.
  - For the casual listener who would not spend the standard £9.99/month in a streaming subscription Amazon is bundling music within its Prime Subscription.
  - Prime Music offers a restricted catalogue of 2 million songs organised into stations and playlists, replicating a radio-like experience that can easily be controlled via its Alexa voice assistant. Prime Music serves as an entry point in the funnel to encourage users to upgrade to Amazon Music Unlimited, its standard unrestricted music streaming plan offered at £3.99/month for Echo device owners or £7.99/month (£9.99/month for non-prime members), the cheapest in the UK.

- Amazon also recently launched a Hi-Resolution streaming offer priced at £12.99/month (£14.99/month for non-prime members) along with a high-end smart speaker, focusing on the niche segment of audiophiles and targeting older demographics of music lovers. With Amazon Music HD and its Echo Studio, Amazon is decreasing the barriers of adoption of Hi-Resolution streaming by offering both the content and its adapted hardware. It is the first major streaming player to penetrate this segment. With this wide range of streaming plans, Amazon has tailored its offering to appeal to the masses while further incentivising users to become Prime members and access its streaming services via its range of Echo smart speakers.

- Futuresource's Audio Tech Lifestyles survey suggests that Amazon Echo owners are three times more likely to subscribe to Amazon Music Unlimited than other respondents, stressing the strong relationship between hardware and services for Amazon, driven by ease of use and compatibility. The survey also highlights that smart speakers are a key driver of streaming adoption for older respondents, owning a smart speaker before a streaming subscription. In 2019, Amazon had an estimated 49% share of the UK smart speaker market with a total installed based of over 6M across its total family of speakers.

| Strengths | Weaknesses |
|---|---|
| Music is part of an extensive eco-system of products and services with strong synergies / Streaming plans optimised for Amazon products | No standout personalisation features |
| Leading position within the voice and smart speaker market | Music is not the company's main priority; it is used as a way to attract and retain subscribers, notably to drive Prime subscriptions and Echo speaker purchases |
| Most affordable streaming plans on the market / Range of Versatile plans targeted at all users, similar strategy than for its speaker range (£30 Echo Dot to £190 Echo Studio) | Does not support podcasts |
| **Opportunities** | **Threats** |
| Growing adoption of voice and smart speakers globally | Most streaming players offer the same music library, strong competition with few differentiators |
| Hi-Resolution audio becoming more relevant than ever (hardware, mobile network and content coming together) | Spotify and Apple Music are already well established in the UK market |
| Potential to attract older demographics through Prime and Echo speaker range | Increasing privacy concerns regarding smart speakers and voice assistants |

# YOUTUBE MUSIC OVERVIEW AND STRATEGY

## Capitalising on YouTube footprint and technology while also leveraging Google Hardware

- With YouTube Music, Google wants to capitalise on the 37 million users who access YouTube each month in the UK.
  - Google offers both a £9.99/month YouTube Music Premium standard music streaming plan as well as YouTube Premium, a bundle with YouTube and YouTube Music providing ad-free experience for both video and music for £11.99/month.
- As a differentiator, YouTube Music uses Google's experience and resources in the domain of AI, machine learning and recommendation algorithms to provide personalised music recommendations to its users.
  - YouTube Music's recommendation algorithm is similar to YouTube's, which drives 70% of the views on the platform. The recommendations are based on multiple factors including location, activity, listening and viewing history to serve music that is relevant to the user's taste but also the context in which the user is listening to music.
  - YouTube Music has also built synergies between its music and video content with Music Video playlists as well as with live performance broadcasts.
- Google had a 41% market share of UK smart speaker shipments in 2019, through its Google Assistant and its Google Home product range, representing a total installed base of almost 3.5 million at the end of 2019.
- Google launched a free ad-supported version of YouTube Music for the users of Google Assistant-enabled devices to create a free integration of YouTube Music with its smart speakers.
  - This free tier also intends to get users in its 'freemium' funnel hoping to upsell to the £9.99/ month, ad-free ,YouTube Music Premium.

| Strengths | Weaknesses |
|---|---|
| YouTube's established user base and strong brand equity / Extensive catalogue of music videos | Launched in 2018, joining an already crowded market with dominant and well established players |
| Google's artificial intelligence, data capture and recommendation technologies | Heavily dependant on YouTube as a platform / Confusion amongst different products and brands |
| Synergies between Google's extensive range of products and services | No standalone desktop app |
| **Opportunities** | **Threats** |
| Important device reach including smartphones through Android, strong millennial reach | Strong competition for time and attention between a multitude of players and formats. YouTube particularly exposed with both video and music involvements |
| On-demand video and audio consumption uptake, shift from traditional TV and Radio to on-demand services | Potential exposure to copyright law enforcement due to the nature of the content that is hosted on YouTube |
| 5G network deployment will increase media consumption as well as replacement of Android devices | Competition with Amazon on the smart speaker market could directly influence YouTube Music uptake |

# STREAMING SERVICE EXPERIMENTS IN RADIO

- In an attempt to offer always more personalised experiences, drive music discovery and extend the range of content available on their platform to appeal to more users, streaming services have been heavily focusing on building radio-like experiences on their platforms.

## Spotify – Algorithmic recommendations and podcast integration

- With its range of human curated selections along with algorithmic playlists and the ability to create personalised radio stations based on a song, artist or playlist, Spotify has put personalised curation at the core of its product offering.
  - To differentiate from the competition, Spotify is focusing on its powerful recommendation engines, which tailor the user experience based on user's taste and listening habits.
- With the significant investments Spotify has made in podcasts, the company has been heavily promoting spoken-word content on its platform.
  - For commuters, it has launched an algorithmic playlist called 'Your Daily Drive' (currently available in the US and Germany), which is a personalised playlist that blends news podcasts and music, getting ever closer to a radio experience.
  - These experiments are also an attempt to better penetrate cars by serving the content that commuters usually get with radio.

*"Alexa, play music for studying."*

## Apple Music – Radio in its DNA

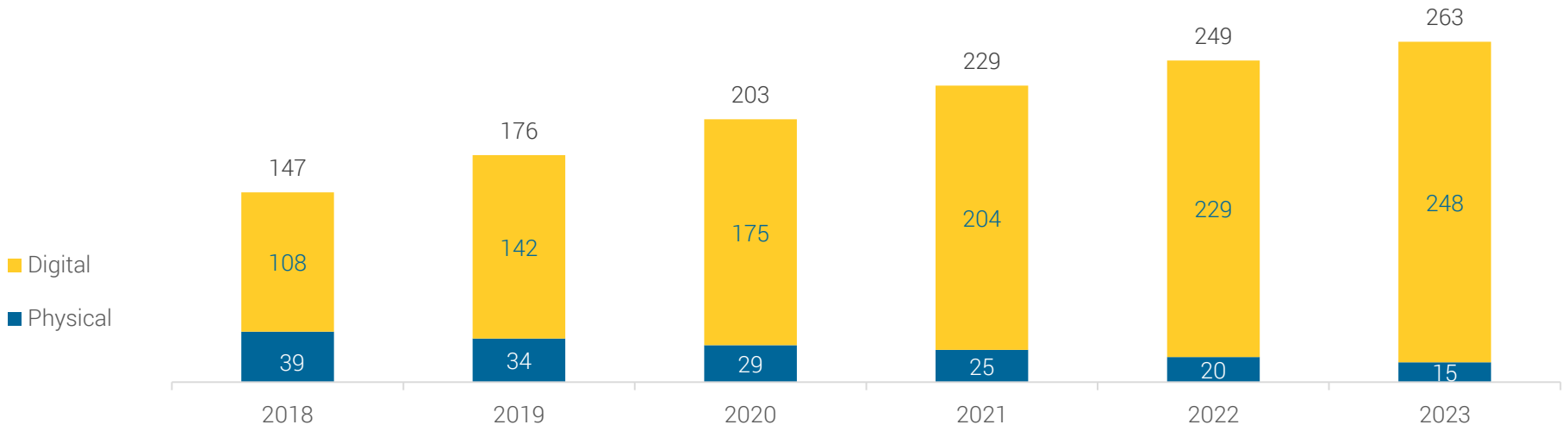
- Apple Music has put human curation at the core of its product. Between its standalone radio Beats 1 and its human curated playlists, the company has been replicating one of radio's key attributes, its power to drive music discovery thanks to the taste-making power of radio DJs.
  - Apple Music has also been working on creating synergies between Apple Music and Beats 1 notably by creating radio shows based on popular playlists.
- Apple Music has integrated this radio approach in its DNA and can easily be seen by the background of the company's key executives. Apple Music UK head George Ergatoudis as well as the company's global creative director and Beats 1 presenter Zane Lowe, for instance, both come from a radio background.

## Amazon– Curation and Lean-back listening with Echo and Alexa

- Amazon has replicated a radio experience with its eco-system of audio products and services. Its Echo speakers are designed to be controlled using Alexa, its voice assistant, and the company's different streaming plans are all aiming to offer a seamless integration with Echo devices.
  - The convenience and lean-back experience of radio has been reinterpreted by Amazon with voice controls and curated playlists.
- This strategy is intended to expand the adoption of streaming to older demographics and offer and an alternative to radio, which integrates a blend of convenience, on-demand content and lean-back listening.

# AUDIOBOOKS MARKET OVERVIEW

UK Consumer Spend on Audiobooks 2018-2023 (£ Millions)




- The time investment required to read traditional books is amongst the biggest barriers to reading for modern consumers. Busy work schedules, strong competition for attention between multiple other formats, including more lean-back experiences such as video streaming have impacted the publishing sector in the UK, with physical book revenues decreasing 5.4% in 2018.
- Digital audiobooks have however arisen as the solution for busy consumers, offering the convenience of audio on-demand content, while being easily accessible on mobile devices through the multitude platforms currently offering audiobooks.
  - The growing adoption of podcasts is also benefiting the audiobook market with more users being introduced to spoken-word content. Futuresource expects this trend to amplify in the forecast period as the podcast audience increases and the traffic on audio platforms grows.
  - As a result, digital audiobook spend in the UK increased 31% in 2019 to reach £142m. This number is expected to grow at a consistent rate throughout the forecast period to reach £248m in 2023.
- CD audiobooks accounted for nearly 20% of the total UK audiobook consumer spend in 2019. As the market develops, Futuresource expects physical audiobooks to progressively be replaced by digital formats, with consumer spend on CD audiobook predicted to drop to £15m in 2023, which would be equivalent to a 6% share of the total audiobook market.

# PODCAST UPTAKE – KEY LISTENING TRENDS (1 of 2)

## The podcast revolution

- While podcasts have been available on digital platforms for a long time, they have experienced a significant resurgence of interest over the past few years with a strong acceleration since the beginning of 2019, which marks the beginning of the investments made by Spotify in the sector.
  - This strong uptake is the result of a combination of cheaper and faster connectivity, increased smartphone and headphones adoption, hit podcast shows such as Serial in the US or My Dad Wrote a Porno in the UK, which drove mainstream awareness on the format, and an increased number of platforms distributing podcasts and making them more accessible.
  - A virtuous circle came into play with more content easily accessible, introducing more users to podcasts and bringing more revenues from advertising. This, as a result, increased the budget and quality of content, and ultimately expanded the reach of podcasts to a more mainstream audience.
- In 2019, podcasts were listened on a weekly basis by 9.4 million adults in the UK, which equates to a weekly reach of 17% of the total UK adult population. This growth can be seen on a global level too, notably in the US, where podcast listenership exploded in 2019 to reach 62 million weekly listeners, representing 22% of the US population and a 30% growth compared to 2018.

## Podcast listening trends

- As the lifestyle of modern consumers evolves with less predictable routine patterns, increased use of public transport, more flexible working hours along with an evolution of the workplace to shared open spaces, the use of headphones and on-demand access to content via mobile devices have made podcast consumption more relevant than ever.
  - With podcasts not being limited to any format, shelf life or geographic constraints, they can focus on niche topics and audiences, which make them particularly relevant in an era of ultra-personalisation and on-demand content.
  - In the same way as YouTube, the important growth of podcast distribution platforms, including some offering built-in production tools such as Anchor (now owned by Spotify), enabled any user to produce and distribute audio content to an audience. This freedom and accessibility along with the cheap production costs of podcasts brought a wide variety of content creators to podcasting from simple talk shows to more produced content.

# PODCAST UPTAKE – KEY LISTENING TRENDS (2 of 2)

- While the podcasting market has a fairly low barrier to entry, as the market develops and revenue increases, production standards and consumer expectations will rise. This will ultimately benefit bigger production companies, which have the resources to produce high budget podcast productions such as drama and fiction, featuring strong plots, popular actors, high quality sound and sound effects as well as big marketing budgets. As a result, Futuresource expects large media outlets and corporations to also penetrate this market in the short to medium term.

| In terms of demographics, this format appears particularly skew towards digital natives who are used to consume content on demand and created by other users often from comparable age groups and with similar interests. In 2019, the under 35 age group was accounting for 40% of podcast listeners in the UK.

- The informal and intimate aspects of podcasts, along with the fact that users actively chose to listen to a specific show and can consume it while doing another activity (commuting, studying/working, etc.) is particularly attractive for this audience.

| Mobile consumption remains the leading way consumers access podcasts in the UK, with smartphones accounting for 73% of total listening hours in 2019.

- While 49% of podcast consumption was already happening at home in 2019, as smart speaker adoption continues to increase in the UK, social podcast listening at home is expected to account for a bigger share than the current 10%.
- In 2019, 5 million smart speakers sold in the UK. Futuresource forecasts that 26 million will be in use by 2023

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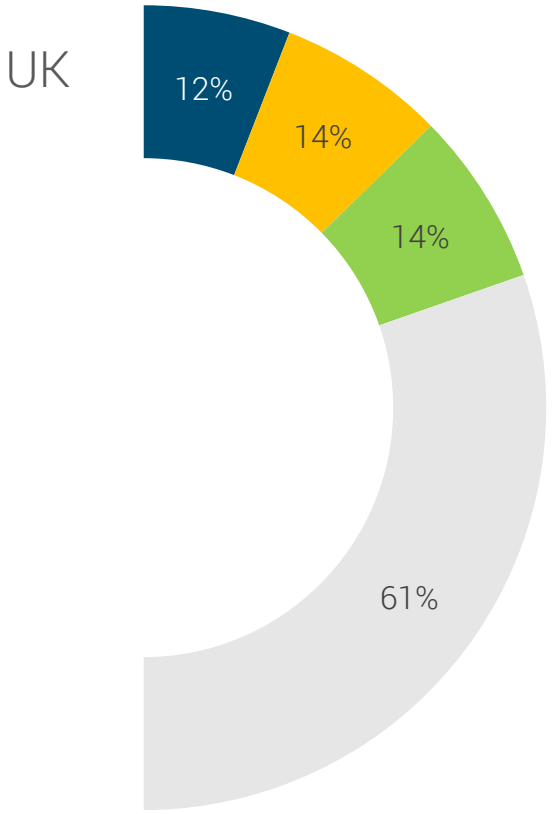
# PODCASTS LISTENING BEHAVIOURS IN THE UK

## Do you listen to Podcasts?

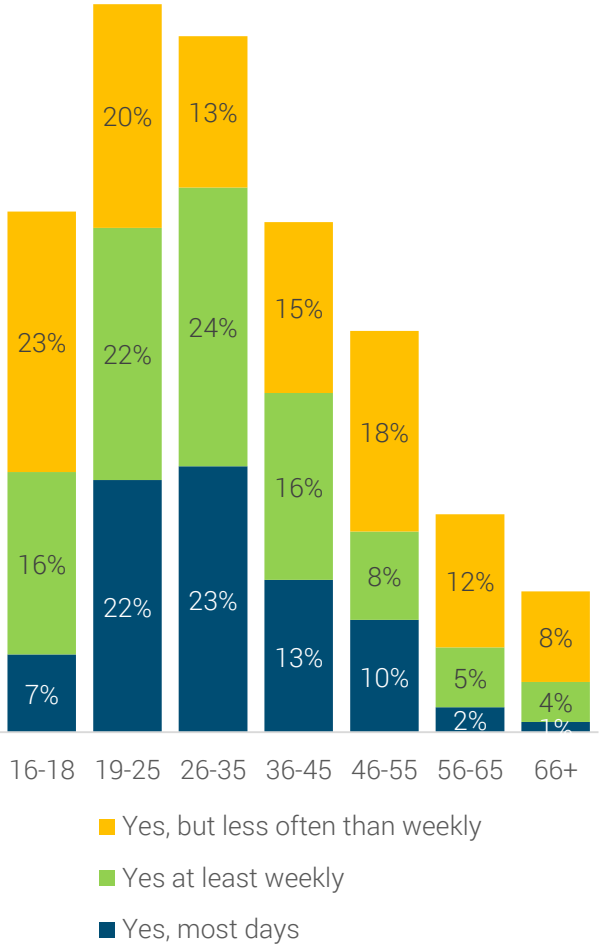
*Base: All Respondents, UK*




- One quarter of the UK online population listens to podcasts at least weekly. This rises to 39% if those who listen less than weekly are included.
  - On average, those who listen to podcasts listen for approximately 5 hours per week.
  - The typical podcast listener subscribes to four podcasts.
- There are significant differences to podcast listening activity by age.
  - The key demographic is 19 to 35 year-olds, with 46% of this age group listening at least weekly, suggesting that it has become a mainstream part of younger people's lives for millennials in particular.
  - This activity begins to drop significantly with age thereafter, with only 7% of 56-65 and 4% of 66+ year-olds listening.

## Do you listen to Podcasts: By Age

*Base: All respondents, UK*



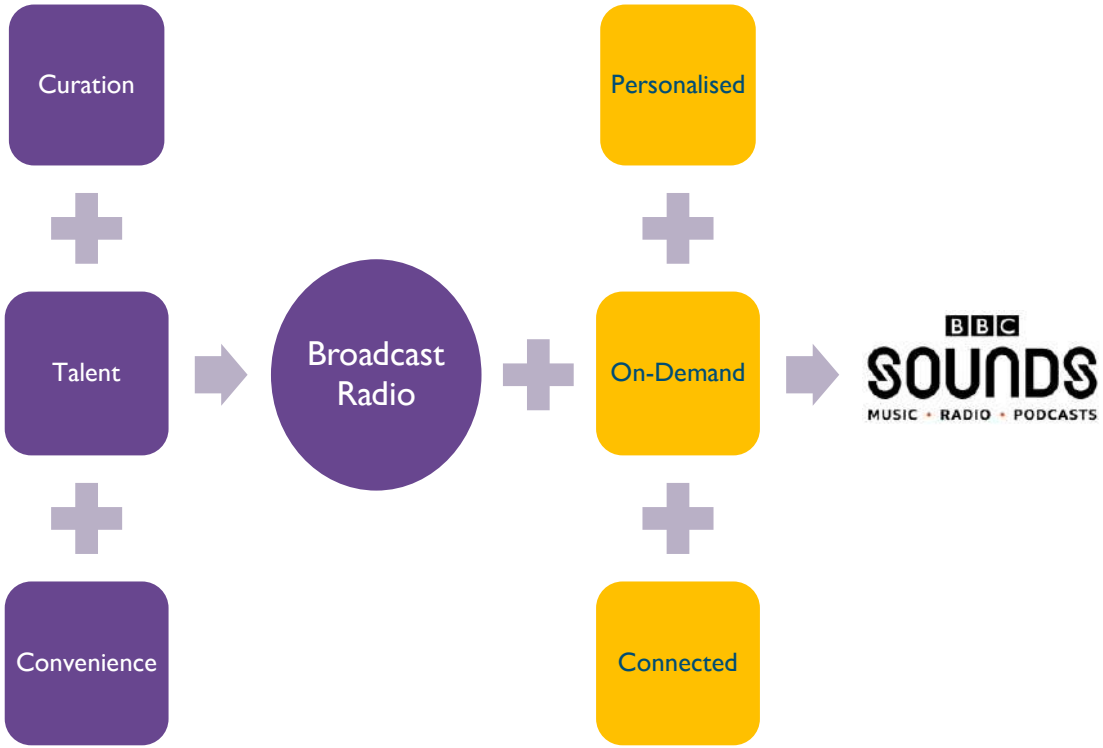

*Source: Futuresource Living with Digital Consumer Survey, 2020. Base: 2,000 Online Adults, 16+*

# MAINTAINING THE RELEVANCE OF RADIO

## Focusing on what makes radio unique and making it more relevant

- Looking at the current competitive landscape for audio in the UK, the biggest threat to radio is coming from streaming services which provide radio-like features while also being better integrated within consumer devices and lifestyles. They blend passive, curated and personalised listening experiences with the flexibility and convenience of on-demand content. Their dominance of the music market is expected to further intensify throughout the forecast period until 2023 with Futuresource expecting streaming subscriptions to reach 36% of the UK population.

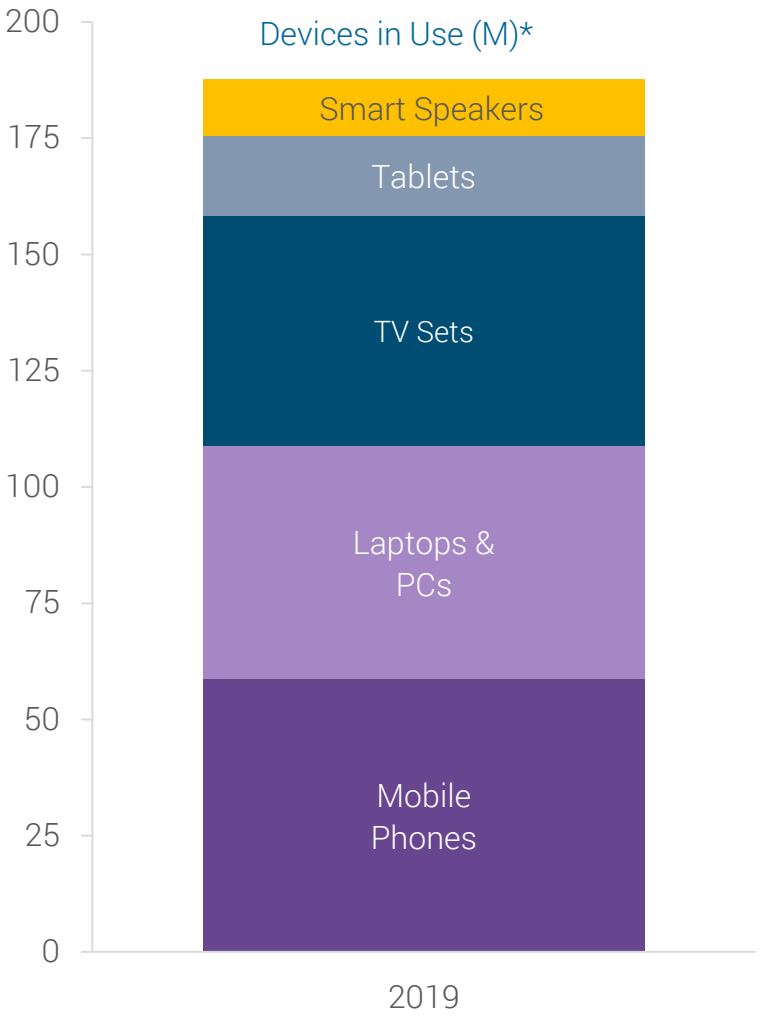
- To remain relevant in these challenging times, radio and notably the BBC have been combining the key attributes of radio with the advantages of streaming services within one app such as the BBC Sounds app.




| Attributes | Commentary |
|---|---|
| Curation | Radio has built its reputation on providing carefully selected programmes and music. In an era of content saturation, curation is amongst the most valuable competitive advantages. |
| Talent | Radio is about people, talents, personalities and voices. This attribute is rare and difficult to imitate. |
| Convenience | With the press of a button, radio offers a constant and uninterrupted flow of live content, which makes it accessible, easy to use, highly reactive to real-time events and does not require further action from the user. |
| Personalised | Offer a personalised experience based on a user's taste and listening behaviours. This personalisation could also include additional data such as for instance location, time, weather, activity. |
| On-Demand | Providing the ability to users to access content at anytime. |
| Connected | Through a radio app such as BBC Sounds, radio can be integrated into connected devices (e.g. Smartphones, Tablets, Cars, Smart Speakers) and be in tune with shifting technology and listening behaviours. |

# OPTIONS FOR RADIO LISTENING GO BEYOND BROADCAST 'RADIOS'

## Smart speaker uptake brings potential to enjoy radio to even more listeners



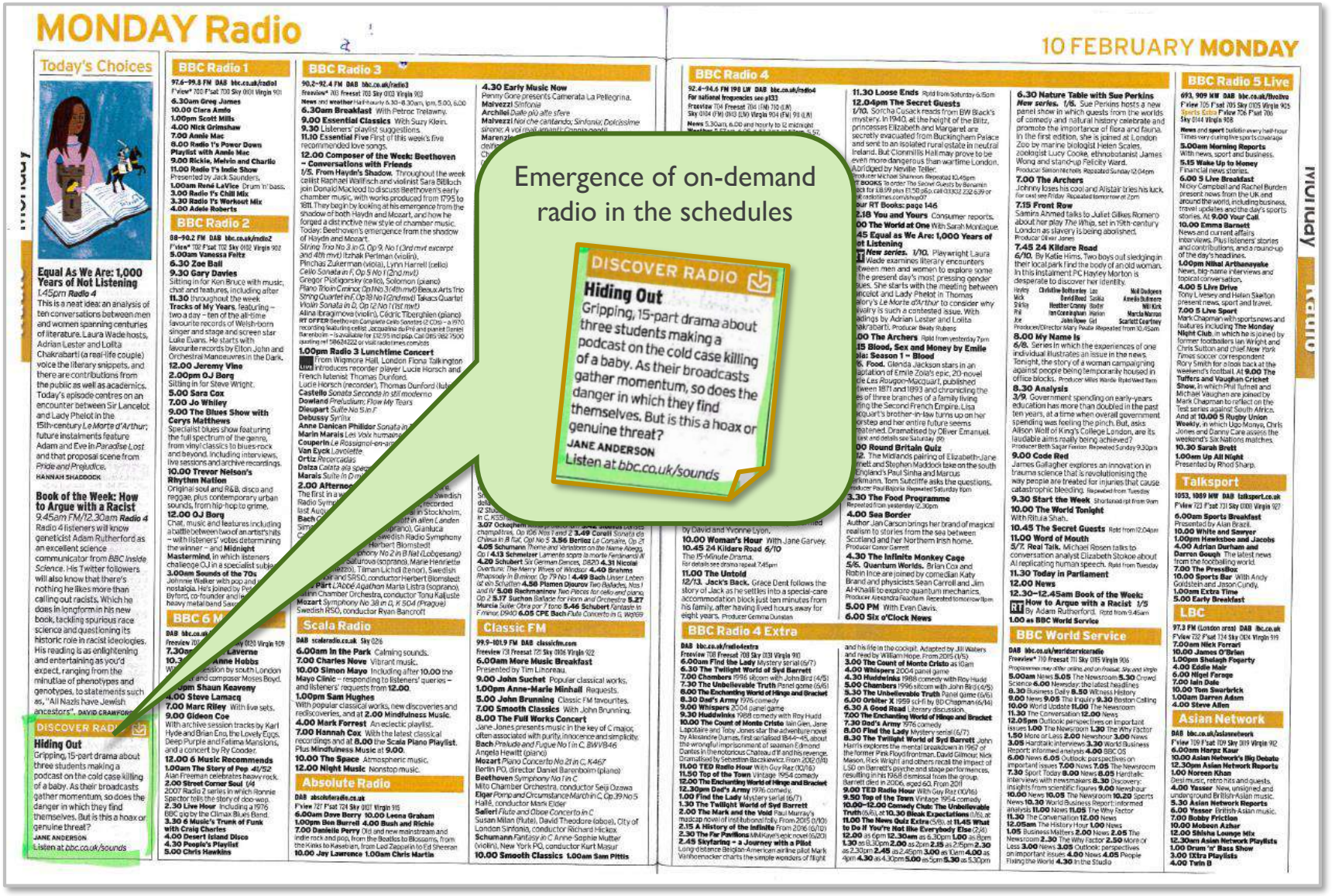

** Futuresource estimate of the installed base of devices in the UK that could be used to listen to radio beyond traditional radio broadcast*

- RAJAR reports that 59% of all radio listening is now done in the home
- Whilst ownership of DAB radios has now reached 65% of households**, sales are now declining at around 10% annually, potentially dipping below 1m units this year. Meanwhile, there is a plethora of other devices in homes which can be used to receive radio either via DTT-TV or streamed via IP
  - This total approaches 200m devices, when mobile phones and computers are taken into consideration, equivalent to 7+ devices per home.
- Whilst ownership of most of these additional devices is relatively static, Smart Speakers are the stand-out growth product
  - Smart Speakers such as those from Amazon and Google outsold digital radios last year by a ratio of nearly 5:1 and Futuresource projects that over 25m will be in use by 2023
  - Although these are cannibalising the radio set market, they also offer - thanks to Apps such as Tune-In and Radioplayer – the ability to tune in to almost every radio station in the UK, plus many thousands beyond, merely by voice command
  - Whilst this brings scheduled radio to millions of devices, Smart Speakers also carry a wealth of other content due to Apps such as Spotify, Apple Music and Amazon Music Unlimited. As the tech giants also supply the voice interface, these devices are geared up to point the user to in-house services where possible – so Alexa will assume requested songs should be played from the Amazon service unless specifically directed. Siri meanwhile will supply Beats 1 Radio if a request for generic radio is made.

*** According to WorldDAB*

# BROADCAST STARTS TO ADDRESS THE PODCAST TREND, BUT SCHEDULE STILL DOMINATES

*Source: 'The Radio Times' February 8th-14th 2020*



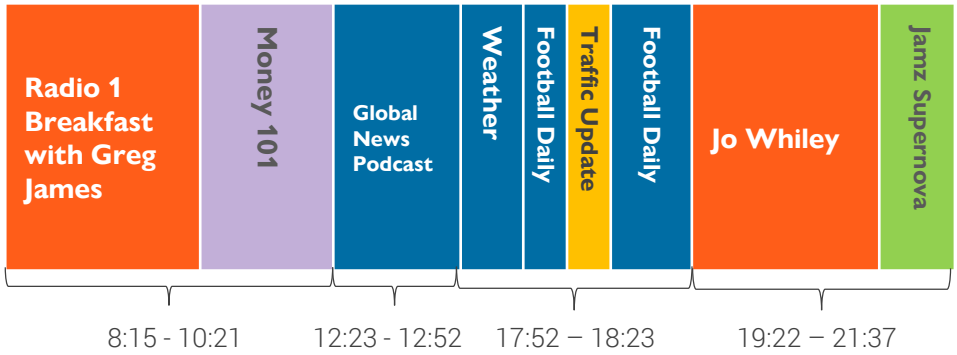
# HOW RADIO OF THE FUTURE COULD LOOK

## Towards a fully personalised radio experience

- In a world of IP delivery, radio can be accessible through an app, as streaming services are today. This facilitates the collection of valuable user data, which can enable the development of fully personalised radio in addition to an offer of on-demand content.
  - This radio would, depending on the user's tastes, listening behaviours and settings, automatically create a flow of personalised content blending live and on-demand programmes as well as feature multiple content types (music, spoken word, news, etc.).
  - The app would take into account the time sensitivity of the programmes based on each user's preferences to offer a seamless, relevant and personalised experience. The algorithm would also capitalise on the years of experience of traditional broadcast radio to make the tailored programme flow feels like the schedule of traditional linear radio.

| Programme | Time Sensitivity |
|---|---|
| Breaking News / Important Traffic Update | Live Priority |
| Radio 1 Breakfast with Greg James | Live |
| Jo Whiley (BBC Radio 2) | Live |
| Global News Podcast | High (same day) |
| Football Daily (Podcast) | High (same day) |
| Weather (BBC Radio 4) | High (same day) |
| Jamz Supernova (BBC Radio 1Xtra) | Medium (within 3 days) |
| The Scene with Claira (BBC Radio London) | Medium (within 3 days) |
| 6 Music's Trunk of Funk with Craig Charles | Low (within 1 week) |
| That Peter Crouch Podcast | Low (within 1 week) |
| Money 101 (Podcast) | Low (within 1 week) |

Example of possible preferences for a given user, based on taste, settings and listening behaviours




Example of a personalised radio schedule based on when the listener tunes in and the time sensitivity of programmes

# VIDEO GAMES AND MUSIC CONSUMPTION

## The gaming phenomenon as a key driver of music discovery

- Gaming in the UK and Worldwide has experienced tremendous growth over the past few years. In 2019 alone, consumer spend on games reached £109 billion globally and £4.5 billion in the UK.
  - Gaming is becoming a true phenomenon, notably in the UK, which is estimated to be the sixth largest video market globally. As a result, experiments from the music industry to leverage this highly engaged audience have multiplied.
- Music has long been an integral part of the gaming experience by heightening emotions and immersion in the game. Music insertion in games has historically been either through the form of original soundtracks or licensed songs from existing catalogues, including the catalogues of popular artists and labels.
  - Games such as FIFA, Grand Theft Auto and Tony Hawk's Pro Skater for instance have put music curation at the core of their experience, with songs and artists featured in these games experiencing significant surges in popularity as a result.
  - Guitar Hero and Rock Band are good examples of games that are entirely focused on music, as opposed to serving only as background. For the artists who had their music used in these games, these features have been incredibly effective in introducing their music to new audiences.
- The development of the Battle Royale genre and its most notable games Fortnite and PlayerUnknown's Battlegrounds along with video game streaming platforms such as Twitch have created new opportunities for artists to reach the gaming community and ultimately extend their audience.
  - A recent example of a successful cross-over between music and gaming is the in-game performance of the DJ Marshmello who performed a virtual concert in Fortnite, which has been virtually attended by 10.7 million people, with also many more people watching the concert live-streamed on Twitch.
  - Another interesting blend between music and gaming has been with the virtual hip-hop group True Damage made up from fictional League of Legends characters but performed by real performers. The group has notably performed at the opening ceremony of the League of Legends World Championship in Paris.

Music-centric game Guitar Hero, released in 2005

Marshmello's virtual performance in Fortnite

Virtual hip-hop group True Damage

# TWO OTHER CONTENT CONSUMPTION TRENDS WORTH NOTING

## More services and formats competing for attention

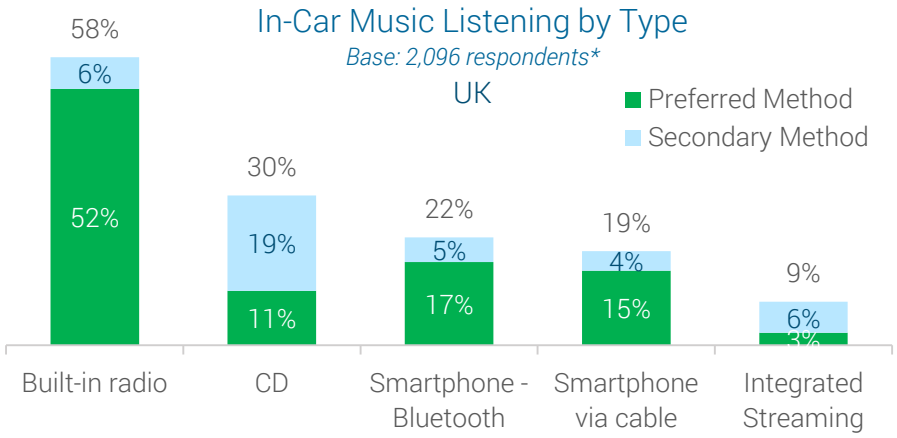
- As the digital economy further develops, so is the number of platforms distributing content, either licensed or user generated. The growing number of these platforms, which can be under the form of, for instance, social networks (e.g. Facebook, Instagram), video sharing platforms (e.g. YouTube, TikTok, Twitch), music and video streaming services (e.g. Spotify, Apple Music, Netflix, Amazon Prime), video games (Fortnite, PlayerUnknown's Battleground); are all creating cross-overs in term of the content they distribute while fostering a very fragmented media landscape.
  - While their purpose and content type can be different, these services are competing with one another for user attention and time spent on their platform.
  - TikTok is a good recent example of a platform that, despite exclusively offering user generated video content, is directly competing with other services by creating strong engagement on its platform, resulting in an estimated average session time of 45 minutes per day amongst the app's 800 million estimated monthly users globally.

## Democratisation of live broadcasting

- In addition to creating an increasingly fragmented entertainment and media consumption landscape, many of these platforms have also started offering live broadcasting capabilities to their users.
  - Facebook Live, YouTube Live and Instagram Live for instance provide their users with the ability to create a live video broadcast and consequently reach and build an audience. On top of offering a wide range of on-demand content on their platform, the addition of easily accessible live video broadcasting features is further exerting pressure on traditional broadcast media such as TV and radio.
  - Twitch, the video-game broadcasting platform, has also had a far reaching effect on the gaming market as a whole. By allowing its estimated 15 million daily global active users to broadcast themselves playing video games or to watch other users playing, this platform has created an eco-system on its own, with some users quickly becoming powerful influencers and generating significant revenues with tips offered by their followers. It also brought the gaming phenomenon to the masses, while creating a new category of video broadcast.

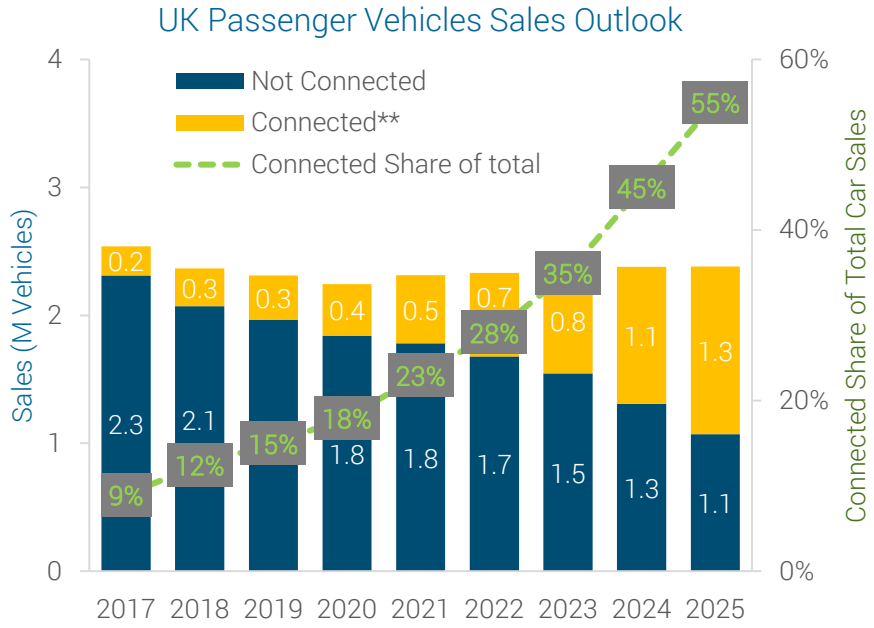
# AUTOMOTIVE INFOTAINMENT

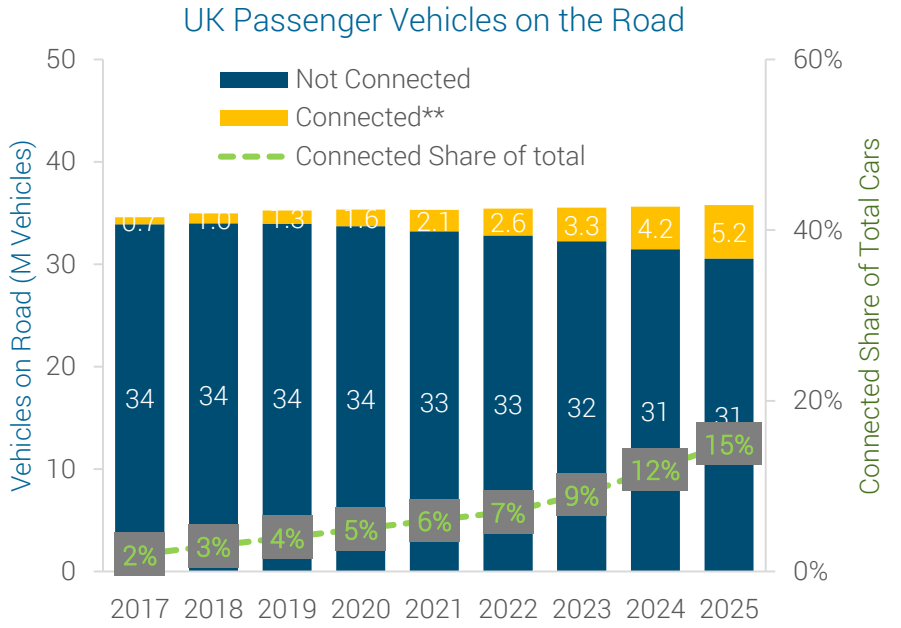
# IN-CAR: BECOMING AN ENTERTAINMENT BATTLEGROUND




** Source: Futuresource Audio Tech Lifestyles, June 2019. The survey covered owners of Headphones and/or Soundbars.*

- 58% of drivers currently use the built-in radio in their car, meaning 42% do not! Reliance on the car radio tallies with age:
  - 82% of drivers aged 66+ but just 32% of 19-25s.
- RAJAR reports that in Q4 2019, 45% of in-car radio listening was digital.
- Futuresource estimates that 15% of the cars on the road by 2025 will be fitted and enabled with connectivity solutions that allow streaming of infotainment content.
  - Whilst a much larger number of cars will be connected (i.e. include a SIM card) the usage will be for a range of areas – safety, remote car management. Car OEMs may elect to monetise infotainment solutions so not all customers will choose to enable the feature.



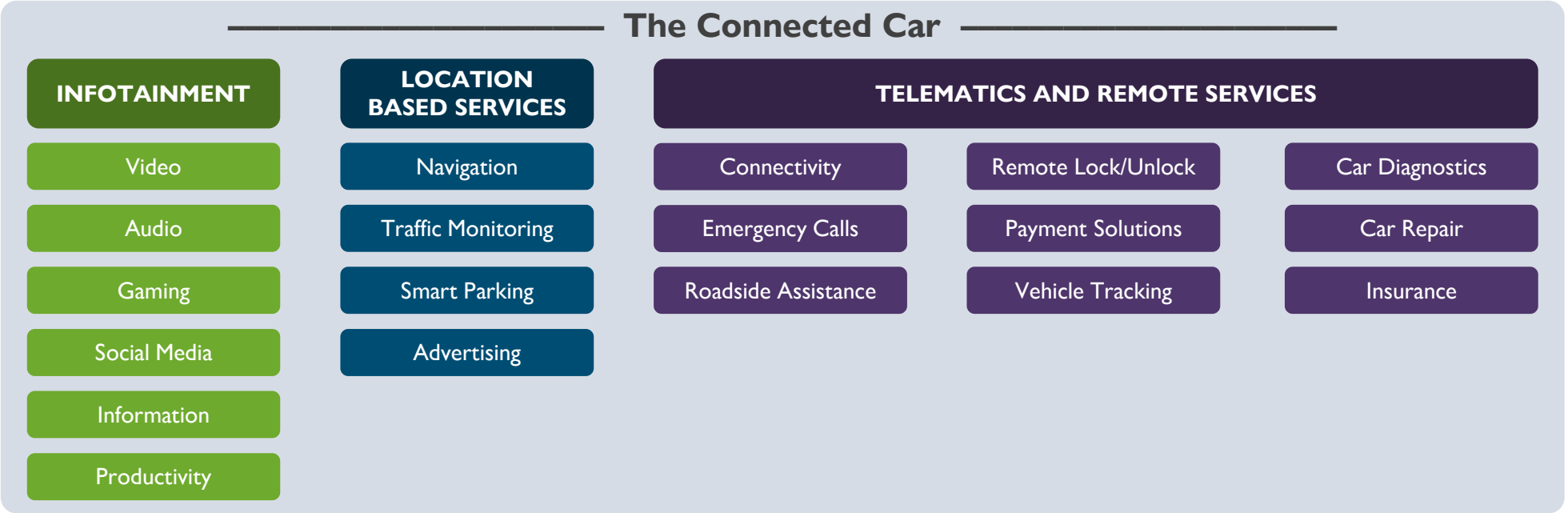






** Vehicles with in-built 4G or 5G which is enabled for Infotainment purposes. Car OEMs may choose to charge for in-car streaming, so this solutions needs to be enabled to be considered 'connected'

# CAR MAKERS PUSHING CONNECTIVITY TO PAVE WAY FOR NEW REVENUE STREAMS

- Automotive OEMs and service providers are keen to ensure cars become increasingly connected as this enables a wide range of new services with which they can develop new revenue streams. As a result, car OEMs are adding SIM cards to cars, but then utilising that SIM for a wide range of applications. Some of the applications may be offered as value-added free services (such as the ability to check the charge level on an electric car remotely via an app) whilst others may be paid for options (such as turning on an in-car Wi-Fi hotspot for a monthly fee).
  - As such, the number of cars that are "connected" (i.e. includes a SIM card) will be much higher than the number of cars that have connectivity-relevant services enabled to allow for in-car entertainment streaming.
  - The European E-Call initiative now mandates that all cars have (at least) 2G or 3G connectivity for emergency response calls.
  - Data collected in the car by leading technology providers will likely be utilised for wider data aggregation purposes, adding value to existing E-commerce and location-based services.
- The launch of C-V2X (Vehicle to Everything) brings significant safety benefits as cars communicate with one another to identify issues.

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# FROM INFOTAINMENT TO ENTERTAINMENT

## As connectivity grows and owners become less occupied by actually driving their vehicle, audio and visual entertainment will play a greater role

- Dashboards are steadily evolving to become full glass cockpits, with multiple displays. Two major technology developments are contributing to this change:
  - Improvements in screen technology, presenting non-rectangular and flexible or curved displays
  - A move towards rich operating systems and mixed criticality systems, all executing on a single chip, via use of virtualisation.
    - A centralised Electronic Control Unit (ECU) controls multiple subsystems.
    - Virtualisation allows multiple operating systems and software services to run concurrently on a single hardware platform, each of which is running in its own domain. These domains are managed and protected by low-level system software known as a hypervisor, which sits below all domains and manages access to the underlying hardware. Each operating system believes it's running natively on the hardware and cannot interact with other operating systems running in other domains. This leads to enhanced security and overall system modularity.
    - In the case of the dashboard, virtualisation allows the cockpit instruments to run independently from the infotainment system. Equally, multiple domains allow the satellite navigation to operate concurrently with ADAS safety systems.

- The expanse of screens permits infotainment systems to become full entertainment hubs, with audio and radio now competing against video and other visual content. In this world, radio is highly likely to become an "app" on the dashboard. With the exception of cockpit instruments, app downloads and preferred screen layout will likely be determined by users.

*Image credit: Harman*

- Whilst the timeline for mainstream consumer adoption of fully autonomous vehicles continues to drift (likely 2030's time frame before adoption at scale) the long term possibility remains.
  - Passengers will be able to watch streamed video content and utilise productivity solutions, as well as listen to content.
  - Internet juggernauts, including Amazon, Google, Facebook, Apple and others will have direct access to the dashboard. They will no doubt place applications and cloud-based services at the heart of the experience.

# INCREASED AUTONOMY WILL TRIGGER MORE IMMERSIVE IN-CAR EXPERIENCES

## Major investment and continued trials of entertainment content delivery put the radio industry on notice of the urgent need to innovate

- Car OEMs are adding increasing layers of technology into cars, this technology can often be used for a wide range of use cases.
  - Levels 3 and 4 of autonomy require driver monitoring solutions to ensure the driver can take over control of the car when required. This same technology can be utilised to offer personalised entertainment services, such as automatically signing users into personalised profiles which link to their favourite entertainment services. Linking these services to car information regarding location, time/distance of travel opens a wide variety of potential extra value-added personalised services.
- Another current area of innovation, is mood tracking software that detects if a driver is feeling angry, tired, bored, sad, etc. and then adapts the car environment (mood lighting, journey route, type of music playing) to suit that mood or, better still, positively influence driver behaviour.
- These entertainment applications are still concepts and a long way from mass scale roll-out but they highlight the focus areas of car OEMs/partners and the trend towards personalisation and immersive in-car experiences; a clear threat to traditional broadcast radio.

Driver Monitoring

- As a result the radio industry urgently needs to innovate to ensure it maintains its strong position in the car dashboard.
  - Exploiting the opportunities presented by digital delivery and specifically the metadata around that is likely to be key. Solutions such as skipping tracks, tagging content for consumption later, providing travel/news updates live and on demand, packaged with HD graphics are the future of radio delivery.
  - Providing car OEM and system makers the ability to seamlessly search, discover and interact with rich content will be critical. Voice assistants are likely to become a fundamental part of the cockpit interface, so radio stations need to ensure they structure their metadata to fully exploit and integrate with voice.

# GROWTH OF STREAMING SERVICES & IN-CAR CONNECTIVITY CHALLENGES RADIO

## Radio remains a fundamental in-car feature, but streaming solutions pressurise broadcast

- The rapid growth in the popularity of streaming music services, combined with the automotive industry trend towards an increasingly connected car, presents a wider range of entertainment options for the driver.
  - The dominant position of broadcast radio in-car has traditionally been a core area of strength for the industry, with analysis from RAJAR stating that 25% of radio listening in the UK took place in vehicles in Q4 2019.
- Broadcast radio continues to hold the strong benefit of simplicity, ease and reliability of delivery. However technology developments are increasingly allowing for delivery of streaming based solutions, with the roll-out of 5G likely to improve this further. Radio's dominant position in-car has always been a "safety net" for the broadcast radio industry, so erosion of this position of dominance significantly alters the competitive landscape. In addition, the explosion in podcasting and spoken word content adds additional competitive (or complementary) layers in the battle for listening time in the car.
- The rise of streaming solutions is leading to an increased trend towards personalisation and interactivity in content consumption.
  - The ability to receive personally curated content, skip tracks, fast forward, rewind, etc., is widespread in streaming solutions.
  - As the automotive industry gradually moves towards autonomous driving, connectivity options will improve alongside so content streaming trends are likely to be amplified.

**Range of factors combining to pressurise broadcast radio's primary status in vehicles**

**Rise of Music Streaming Platforms and Spoken Word**

The leading five music streaming sites – Spotify, Apple Music, Amazon Music, YouTube & Deezer – grew paying subscribers in the UK from 13.6m in 2018 to 16.9m in 2019

**Rise of In-Car Mirroring* and Embedded Solutions**

Apple CarPlay, Android Auto, Baidu Car Life and Mirror Link are now widely deployed in new cars with leading music streaming and entertainment apps integrated. Aftermarket offerings also available

**In-Car Connectivity Growing Strongly and Smartphone Utilisation Widespread**

Mirroring solutions have simplified usage of smartphone connectivity. 15% of new cars were connected and enabled for infotainment applications in 2019, and 65% of new cars included smartphone mirroring as standard

**With technology and connectivity advances end users are going to have greater choices between linear broadcast content versus personalised streaming content**

** Smartphone Mirroring – defined as In-Car platforms that enable smartphone mirroring onto the head unit*

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## CarPlay, Android Auto, Car Life and Mirror Link offer a practical smartphone 'mirroring' solution to allow users to utilise their favourite apps in-car

- The launch and fast uptake of CarPlay and Android Auto has simplified hands-free usage of smartphones and associated apps in-car.
  - Users can employ a Bluetooth or cable connection via their smartphone data connection.
  - CarPlay and Android Auto now have a wide range of leading music streaming and radio aggregation Apps available (coverage varies by platform). Both platforms have also penetrated the car industry at scale, with both integrated in more than 60 car OEMs offerings worldwide. Whilst some OEMs were slow at first – for example BMW was reluctant to integrate both platforms at first but later changed its mind – nearly all leading OEMs now integrate both platforms.
    - Country availability is still extending for each platform, but both are currently available in 36 countries, including the UK.
    - After-market head units are trending towards including both platforms, though the cost of aftermarket integration is relatively high; typical head units are in the £300 range and normally require specialist retailer fitting.
  - The open standard Mirror Link is also utilised by a wide range of car OEMs such as Ford and Toyota.
  - Growing access to IP services broadens the range of content available to the vehicle, including radio stations (both local and international) which are not within the broadcast signal area.

Leading Music Streaming Platforms

Spotify
YouTube Music
amazon music
Google Play Music
TIDAL
deezer
MUSIC

Chart provides a sample of popular apps that are available on either/both of Apple CarPlay and Android Auto.

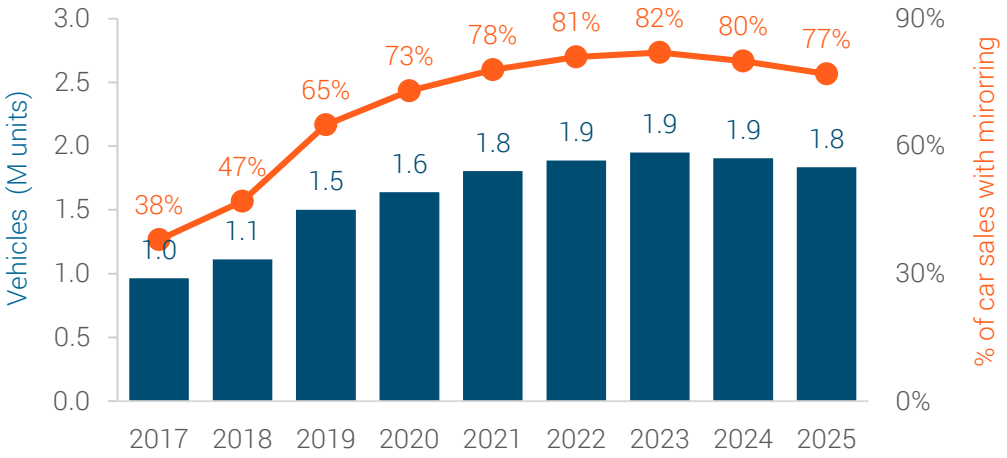
Popular Radio Aggregation and Entertainment Apps

audible
iHeart RADIO
pandora
CASTRO
npr one
TUNE IN
BBC SOUNDS
STITCHER
Overcast
Pocket Casts
Radio player
audiobooks.com
Google Podcasts

# MIRRORING SOLUTIONS BRING STREAMED CONTENT TO THE CAR

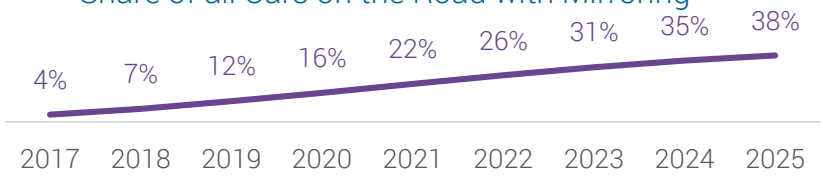
## 13.5 million cars with smartphone mirroring solutions expected on UK roads by 2025

Sales of Passenger Cars With Integrated Smartphone Mirroring Solutions (M Units)




Sales of Aftermarket Smartphone Mirroring Solutions (M Units)

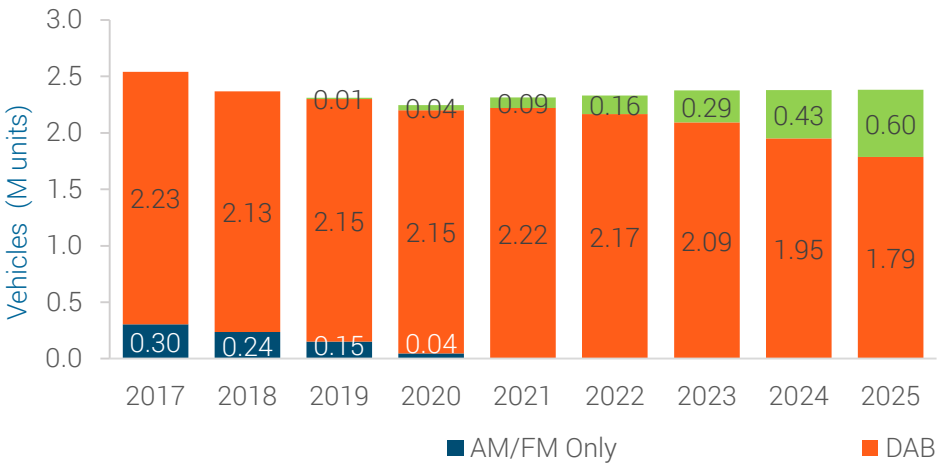
Share of all Cars on the Road with Mirroring



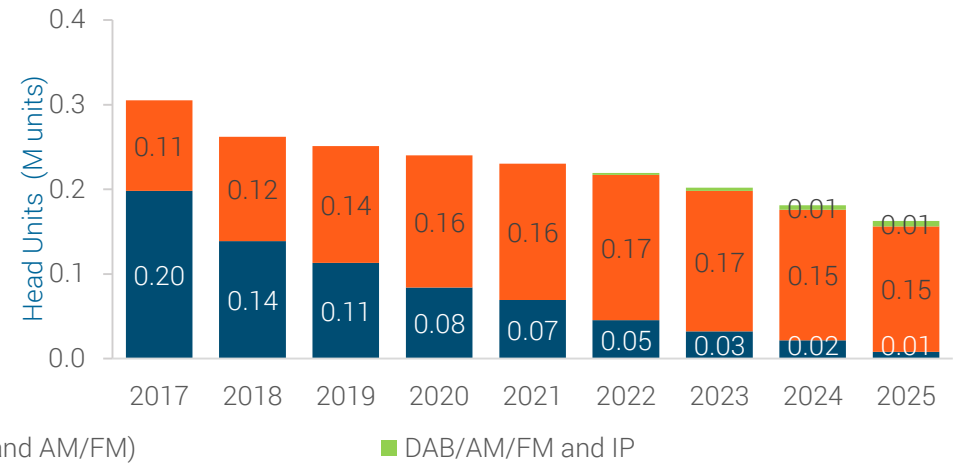

- The last three years have seen a rapid growth in the uptake of mirroring solutions such as CarPlay and Android Auto, with key music streaming platforms widely integrated and increasingly targeting direct car OEM relationships. The use of tethered smartphones for streaming is widespread, sometimes with mixed results due to coverage issues and data costs.
- Sales of smartphone mirroring solutions will grow as car OEMs incorporate it into their vehicle ranges and geographic coverage improves.
  - Google and Apple both refreshed their automotive offerings in mid-2019 with new features and a greater level of tailored car functionality. Car OEMs continue to extend their uptake of CarPlay and Android Auto. Toyota finally introduced CarPlay and Android Auto in 2019 ranges following many years of refusing to integrate the technology.
  - Both companies are controlling how their platforms look and feel, with certification control over deployment.
- In addition to adopting mirroring solutions, vendors are developing full embedded OS infotainment solutions. Google launches its Automotive OS in 2021 with GM, Volvo and the Renault-Nissan-Mitsubishi alliance all confirmed adopters. As embedded solutions develop, they will take share from mirroring solutions although there will also be significant overlap as OEMs offer flexibility to users.

# BROADCAST RADIO WILL REMAIN STANDARD FIT IN CARS

New Passenger Car Sales by Head Unit Reception Type




Car Head Unit Aftermarket by Reception Type




- DAB is now becoming standard fit in new vehicles, with only 7% featuring AM/FM last year.
  - All cars will be fitted with DAB from late 2020, but Futuresource anticipates these head units will continue to offer analogue too during the forecast period.
  - Additionally, these will increasingly be offered as a hybrid with IP, enhancing the visual appeal of radio via RadioDNS, quickly followed by streaming services sourced directly from the cloud.
- On the aftermarket side, DAB has been slower to take hold.
  - Mainly because these purchasers are primarily motivated by Bluetooth streaming, with less interest in the type of radio involved.
  - Also because many of the key brands involved in the aftermarket are international players, less interested in providing dedicated models for DAB/DAB+.
- The head unit aftermarket is in long-term decline, largely because vehicles are increasingly complex, with fully integrated dashboards, making aftermarket installation a much more difficult process than in former times.

# LEADING STREAMING SERVICES NOW WIDELY INTEGRATED INTO KEY PLATFORMS

## Music streaming is widely available on leading platforms

| | Country Coverage | Approx. No. of Car OEMs – Integrated * | Approx. No of Car Models – Integrated * | Music Streaming Services Available (Note: offerings are available in the UK but may vary elsewhere) |
|---|---|---|---|---|
| CarPlay | 36 | 60+ | 500+ | Spotify, TIDAL, amazon music, YouTube Music, deezer, Google Play Music, MUSIC, napster |
| androidauto | 36 | 60+ | 400+ | Spotify, TIDAL, amazon music, YouTube Music, deezer, Google Play Music, MUSIC, napster |
| MirrorLink | | 15+ | 90+ | Spotify, deezer |

Some Car OEMs have developed their own interfaces based on the MirrorLink standard

Music Apps can be delivered through the RockScout SDK on MirrorLink

** Figures on a worldwide basis*

- Apple announced at its iOS 12 launch (WWDC June 2018) that it would bring third-party apps to CarPlay, notably Google Maps and Waze opening up the platform to competitor offerings. It already included Google Play Music.
- As OEMs develop embedded solutions they are also embedding music apps directly onto their head units.

# CARPLAY, CAR LIFE AND ANDROID AUTO GAIN TRACTION

## Technology providers help drivers utilise their Smartphones and favourite Apps Handsfree. Wide range of partnerships developing

**2014 March** – Apple announces CarPlay at the Geneva Motor Show with Ferrari, Mercedes and Volvo as first partners

**2015 March** – Android Auto launched

**2015 May** – Hyundai first OEM to launch Android Auto on the 2015 Hyundai Sonata

**2015 June** – Apple announces CarPlay available in 100 vehicles and 21 brands

**2015** – Baidu launches Car Life for Chinese market

**2018** – Google Assistant introduced to Android Auto allowing voice control

**2018 July** – IOS 12 launches with third-party maps, Google Maps and Waze included for the first time

**2019 Jan** – Spotify introduces 'Car View' to simplify usage of Spotify in car

**2019** – Sirius XM purchases Pandora for 3.5 $ Billion

**2019** – Lincoln announces it's integrating Tidal's streaming service into some ranges

**2019 July** – Major redesign of Android Auto announced, platform resembles mobile platform more closely

**2019** – BMW announces it will make CarPlay a subscription service for cars with Operating System 7.0

**2019** – Apple announces major updates to CarPlay in iOS13 with significant redesign of interface

**Current** – CarPlay available in more than 500 models and 60 brands

**Current** – Android Auto available in more than 400 models and 60 brands

** All data on this chart is global*

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# SPOTIFY TARGETING THE CAR MARKET

## Integrating with car dashboards, offering personalised content and trialling an adaptor

- As access to Spotify in car develops rapidly, Spotify continues to add to its platform and develop its offering.
  - Tesla announced Spotify integration in its latest OTA software update, one of the last significant car manufacturers to do so.
  - In February 2020, Jaguar announced Spotify will be embedded directly into the dashboard of its F-Type.
- Spotify also launched a voice enabled assistant Car Thing in May 2019. It is not available for commercial sale (being provided free of charge to selected Spotify users in the US) and Spotify has openly stated that it has no intentions to develop hardware for commercial purposes. It is being positioned as a test with Spotify wanting to understand how people listen to content in their car.
  - As voice assistants gain greater penetration in car, content discovery is likely to change with voice assistants likely to lead to different means of content discovery. Spotify has played a significant role in content discovery for music with its curated playlists and personalised offerings. The infrastructure around podcasting discovery is less developed however and this is where Spotify could bring its expertise and use feedback from the Car Thing trial to develop its offering.
  - Spotify has also launched a radio like feature for US subscribers called Your Daily Drive, mixing short form news updates, podcasts, with personal favourite tracks and a few interspersed new tracks. It is Spotify's direct challenge to traditional drive time radio. As its podcasting offering develops, expect more advanced playlists that mix highly personalised content including a range of different mediums (news, music, podcasts, audiobooks etc).

Car Thing connects to 12-volt outlet and uses the phone connection. Responds to voice commands.

Jaguar's F-TYPE dashboard is to feature the Spotify app which will be integrated into the Touch Pro Infotainment system

# DIGITAL RADIO PROVIDES OPPORTUNITY FOR INNOVATION

## New interactive services are developing as digital delivery matures

- Digital radio delivery has the potential to offer valuable metadata that could be used in a variety of ways to provide personalised and interactive services.

*Services outlined in green are possible via DAB, whilst those in blue are more relevant to IP delivery*

### Add Rich Visuals to Dash

HD graphics can be added to provide the user with additional information around station/artist/tune etc. Potentially simplifies station/content discovery and adds impact to advertisers

### Live Traffic/News/Emergency Information

Live information can be embedded into the digital feed at the stations discretion, to provide traffic updates and emergency alert information providing strong localisation

### Content/Station Discovery

Features that simplify content/station discovery. Especially useful for example when identifying and saving podcasts episodes of interest

### Rewind Live Broadcast

The ability to rewind live broadcast is emerging, providing a useful feature

### Cross Promotional Info

Ability to cross promote associated audio offerings, such as a link to a podcast of the current program

### On Demand Playback

Users can request to listen to certain information at the push of a button, or potentially via voice command i.e. News/Sport/Weather

### Tagging of Content

Users can push a button (or potentially use voice) to tag specific content that they'd like to listen back to

### Skip Song/Merge Back

Potentially adding huge benefits for users, users can choose to skip a song and then merge back over time

# BROADCAST RADIO UNDER PRESSURE TO INNOVATE

## A battle between personalised content delivery v linear is developing and broadcast radio needs to respond to the personalisation trend

DAB Radio gaining traction

~2.5m new cars sold in UK in 2019 with DAB/DAB+

- As music streaming platforms continue to grow and alter user content consumption expectations towards greater levels of personalisation and interactivity, the threat to traditional broadcast radio is clear. Longer term, as the industry moves towards autonomous vehicles, these trends will be amplified.
  - Whilst streaming services are growing in popularity, they are not without issue. Delivery via mobile networks can be a mixed experience with road coverage, consumer data costs and dropouts an issue.
  - Technology providers are working on solutions that provide a more seamless experience, consuming content in and out of home. This is likely to be the case in-car where a car knows who the driver is and therefore preferred services are automatically loaded.
- The onset of radio via IP allows for innovation and the opportunity to enhance the consumer experience, improve measurement capabilities for advertisers and create value added services.
- With digital signals able to provide metadata, search is enabled and on-screen information such as album art, song info can be displayed. Digital radio also provides possibilities for a wider range of channels giving flexibility to broadcasters to expand their portfolios.
  - In addition, digital radio can enable live information flow such as delivering up to date traffic information providing added value.
- The roll-out of digital radio services is accelerating; DAB is gaining momentum in Europe and Australia.
  - The EECC directive requires all new car radios in the EU to be capable of receiving digital terrestrial radio by the end of 2020. Norway, Switzerland and the UK are leading digital adoption across Europe, but other countries are working through their adoption plans.
  - Whilst aftermarket head units are not currently included in this directive, individual countries are able to introduce their own regulations. France and Italy have both introduced laws stating that DAB+ must be integrated into aftermarket units and other countries are understood to be considering doing the same.
- Many radio broadcasters have been slow to transition to digital delivery due to a myriad of challenges including changes to traditional business models (higher music royalties) and major infrastructure update requirements.

# DIGITAL RADIO UPTAKE PROVIDES OPPORTUNITY FOR INNOVATION

## Digital radio provides metadata that can be used to develop interactive services

- Hybrid radio delivery conveys valuable metadata that could be used in a variety of ways.
  - One challenge to widespread digital deployment though has been the complexity in technology upgrade and the business model required to maximise metadata usage. Digital delivery typically requires a business model shift to a 'per play' artist royalty model, which is complex to transition to from traditional broadcast radio models.
  - In order to maximise metadata usage to develop interactive services, that metadata must be structured effectively. Industry feedback suggests many broadcasters are either struggling to implement, or do not have in place, the necessary technology stack required.
- Radio broadcasters, as with all other solution/service providers, will have to fight for their position on an increasingly cluttered infotainment dashboard and avoid being 'just another icon'.
  - With car interfaces likely to evolve into multimodal designs – a combination of voice, touch, dials, potentially some gesture controls – radio needs to integrate effectively and efficiently with the other key constituent parts.
  - Next generation voice assistants are likely to act as the core search, command and control engines. Ensuring metadata integration, will be key to maximising new digital opportunities.
  - If implemented correctly, there are some new applications which are currently being trialled or seeing relatively small-scale roll-out;
  - The ability to skip a song (being passed to a favourite song of choice) and then merging back into the live stream is a feature being trialled, whilst relatively difficult to do, it is possible with the right infrastructure.
  - Tagging of content, to allow for playback at a later data is possible (potentially on a tablet/mobile) via a physical button or potentially voice.
    - One challenge that exists with such a personalised model however is a discussion around data protection (particularly in the EU with GDPR legislation). With multiple potential occupants in-car and metadata that needs to be shared with potentially multiple providers, it complicates the issue.

# HYBRID OF BROADCAST AND IP LIKELY TO BE THE WAY FORWARD

## Hybrid Radio is seen as a means for radio to innovate and develop new value-added features

- Hybrid radio is seen as offering the best of both worlds, capable of switching between analogue (cost effective, reliable and robust) and digital over the air (provides meta data, high resolution visuals, interactivity) sources for the same station
  - Hybrid radio is relatively early in its development path. Radio DNS is a not for profit standards association that is seeking to lobby and develop open standards for hybrid radio roll-out. Major western broadcasters are supporting the standard.
  - Initially broadcast radio needs to be transmitted in the correct format for hybrid radio and the UK is already well developed in this process (also Germany and Spain) with others increasingly following.

Audi – the first vehicle manufacture to introduce Hybrid Radio

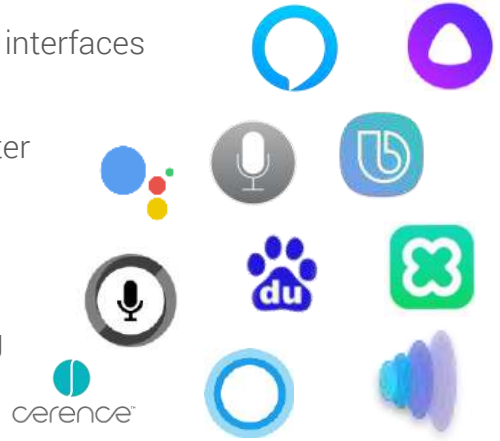
- It is anticipated that Hybrid Radio will penetrate the automotive industry, offering broadcasters and Car OEMs flexibility in deployment
  - Combining the benefits of analogue and digital delivery gives the flexibility to the broadcaster to move between delivery formats depending on the most logical delivery at that time. For example, IP delivery could be used as a 'range extender' when the car goes out of range of the broadcast, then when the car comes back into broadcast range it automatically switches back (to the more cost-effective solution).
- Audi was the first OEM to launch a Hybrid radio solution on its 2019 A8 and it has committed to wider roll-outs moving forward.
  - Audi has primarily positioned Hybrid radio as a range extending solution
  - Other car OEMs are expected to launch solutions in 2020

Radio DNS® HYBRID RADIO

# ROLE OF IN-CAR VOICE ASSISTANT SET TO GROW RAPIDLY

## Voice assistants enable consumers to choose discover content much more easily

- Owners of Smart (Voice Assistant) Speakers in the home generally report that this interface enables them to search and discover content more effectively, meaning that they spend more time enjoying content.
- The same dynamic is beginning to find its way into the car, where a hands-free interface has obvious benefits, enabling users to be more purposive in their choice, rather than defaulting to whatever radio station happens to be playing at the time.
- 'The long product car lifetime (10 years + is typical) and long development cycles of the automotive industry (design cycles are typically at minimum 2+ years) have traditionally restricted in car technology innovation.
  - With traditional in-car voice assistants typically utilising a relatively limited range of commands with a "command and control" style interface (i.e. say 1 to call, 2 to message), the reputation of in-car voice assistant technology has traditionally not been strong.
  - The success of consumer voice assistants has helped to educate customers as to the benefits and usage possibilities of voice technology, specifically the fluid 'conversational' nature of today's solutions.
- New business models and revenue opportunities are developing as cars become increasingly connected and this is leading to a much greater level of focus on technology based innovation. Digital cockpits are likely to transition towards multi-modal platforms integrating a combination of voice, touch, physical dials/buttons and potentially gaze tracking/gesture solutions.
  - Voice is likely to become a fundamental part of the cockpit and the next generation of in car voice interfaces are going to lead to significant innovation and a fast-changing supply side dynamic.
- A wide range of solutions are entering the market, targeting both native factory fitted integration and after market solutions.
- Sales of integrated virtual assistants are expected to accelerate, reaching close to two-thirds of cars sold by 2023.
  - Car OEM-branded assistants are increasingly expected to move towards hybrid solutions, utilising both processing at edge and in the cloud to develop a robust, best of both worlds solution.
  - CarPlay and Android Auto continue to gain traction whilst Alexa and Google Assistant are expected to gain market share alongside Car OEM-branded assistants.




Leading Voice Assistant Vendors

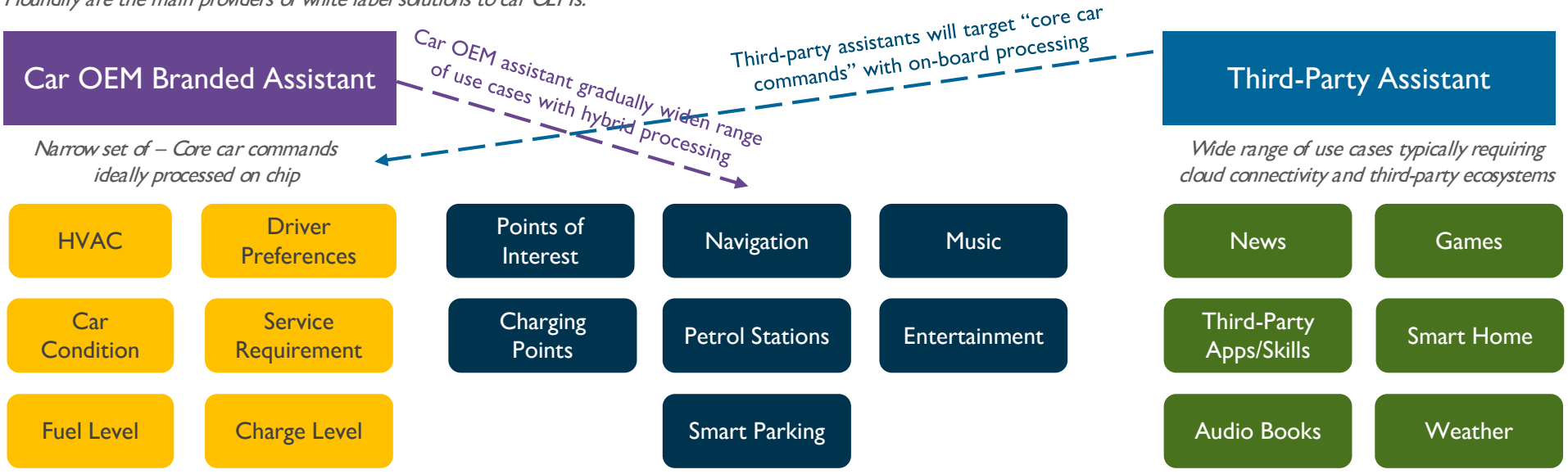
# VOICE IS A WEAPON IN THE BATTLE TO CONTROL THE IN-CAR ENVIRONMENT

- As the competition for automotive voice assistants intensifies, the industry trend is towards dual assistants with an OEM branded assistant working alongside a third-party assistant. Car OEMs typically want to maintain control of core car commands and information via CANBus integration which they can use to receive key information about the car performance and user habits and preferences (all of which could lead to new, potentially personalised service offerings).
- With third-party assistants expected to focus on adding on chip processing to enable natural "core car functions" a major battle is looming. Car OEM assistants are adding cloud processing capabilities to traditional on-board processing, leaving car OEMs with the difficult choice of whether to provide wider entertainment-related functions themselves or to partner with third-party assistants.

*Car OEMs are focusing on controlling a relatively narrow set of core car functions, with the majority of processing managed on-chip to ensure core functionality not impacted by connectivity blackouts. Cerence and Houndify are the main providers of white label solutions to car OEMs.*

*Use cases that could utilise either assistant. Navigation/local services likely to be key as these lead to personalised and location-based services.*

*Traditionally cloud based processing, increasingly expected to add hybrid processing capabilities to allow for targeting core car functions. Alexa SDK includes car core functions.*




*N.B – the above chart does not cover every application/use case and is a designed as a generic overview. There will be exceptions and differences per OEM/Provider.*

# WIDE RANGE OF SOLUTIONS FOR AUTOMOTIVE VOICE ASSISTANTS

## Car OEM Branded

*Car OEMs are investing in their own branded assistants based on white label platforms and far field technology (typically from Cerence or Houndify) with close integration with core car functions (and CANBus integration). For example the Mercedes MBUX.*

White Label solution from Cerence or Houndify – branded as Car OEM solution

## Third-Party Assistant

*Alexa is making inroads into native car integrations with multiple partnerships existing including BMW and Audi. Google has signed agreements with Volvo and the Renault Nissan Mitsubishi car group for their 2021 range. To date most integrations have not involved deep integration with car functionality as Car OEMs have wanted to maintain control of this, though Amazon has developed its SDK to include this functionality.*

Alexa, Google Assistant, DuerOS, Cortana or Alice

## Smartphone Mirroring

*CarPlay and Android Auto are now widely integrated into new models from nearly all manufacturers. Phone connectivity is typically utilised for microphones, with a software SDK embedded on the head unit. Assistant geographical availability is currently not as widespread (especially Google Assistant) as typical consumer product coverage. Baidu Car Life developing position in China and Yandex Auto in Russia.*

CarPlay, Android Auto, Car Life, Smart Device Link

OEM/native integration

Aftermarket integration

## Home To Car

*Car OEMs have for many years been developing apps to offer their customers a range of ancillary services. For example the BMW Connected App has over 1.5 million users worldwide. Car OEMs are now including Alexa and Google Assistant skills into these apps to allow some specific remote management functionality. Primary functions such as checking car charge/mileage status, service requirements, remotely turning the car on, locking/unlocking are typical.*

Large number of Car OEM apps

## Aftermarket Accessory

*2018 saw the introduction of Aftermarket accessory products. Accessory provider Anker launched the Roav Viva (Alexa) and Roav Bolt (Google). Amazon Alexa Auto now launching internationally. Utilising Smartphone connectivity, the solutions are focused primarily on adding hands free entertainment, calling and messaging functions without any integration into car functionality.*

Alexa Auto, Roav Viva, Muse, Garmin Speak, Roav Bolt, JBL Link Drive, Chris

## Aftermarket Smartphone Mirroring

*Global demand for aftermarket audio is slowing but CarPlay and Android Auto are taking an increasing share of head unit sales. As with factory integrations, CarPlay/Android Auto work with smartphones.*

CarPlay, Android Auto, Car Life, Smart Device Link

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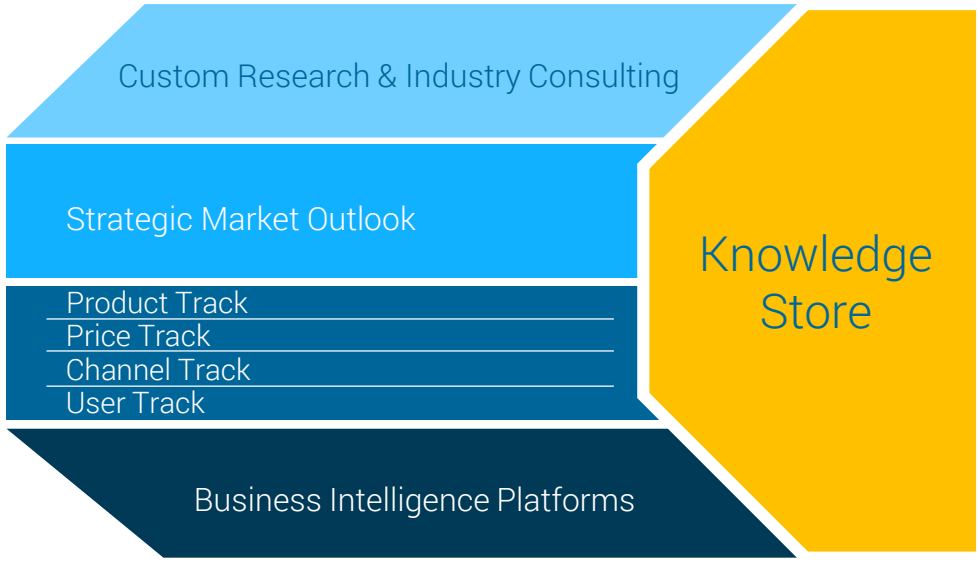
# APPENDICES

# THE FUTURESOURCE APPROACH




Market entry, diversification, competitive strategies, customer segmentation and satisfaction, benchmarking, concept testing.

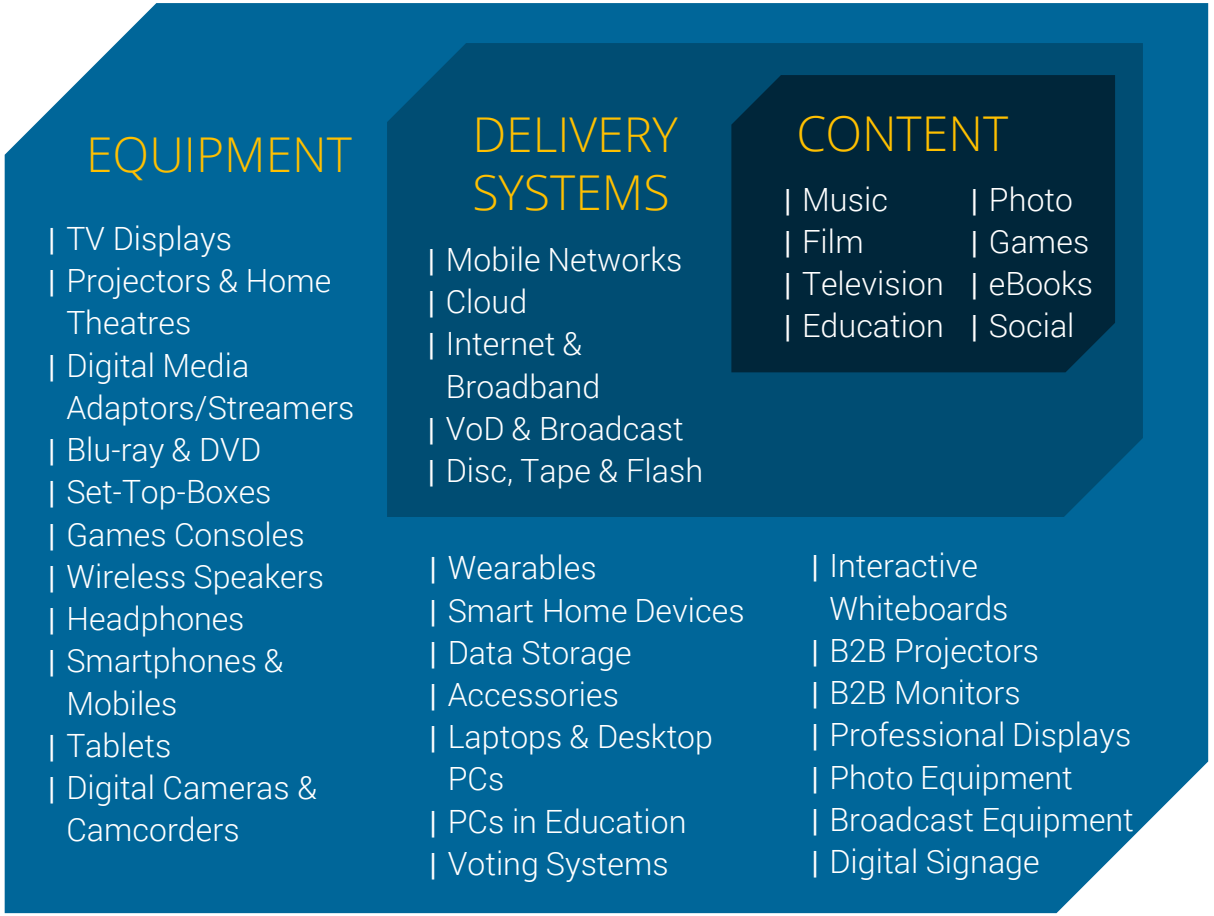
Annual subscriptions of holistic, sector-wide tracking and forecasting services, regular bulletins and access to the analyst teams

Annual subscriptions for product track – market sizing, forecasting, trends; internet-based price track by SKU, spec, country; channel track panels and syndicated end-user track panels

Customised platforms that centralise data, stock, sales promotion tracking and channel margins

Purchase individual reports, market data, technology rundowns and country profiles when you need them, with no ongoing contractual requirements

# FUTURESOURCE MARKET FOCUS

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## About Futuresource

Futuresource Consulting is a specialist research and knowledge-based consulting company with a heritage stretching back to the 1980s.

Its insight and global market coverage are based on informed regional expertise, ensuring its portfolio of world-class clients is fully supported in research, analysis, strategic planning and decision making.

- Consumer Electronics
- Print & Imaging
- Media & Entertainment
- Education Technology
- Optical Disc Manufacturing
- Broadcast Equipment
- Professional Displays

# Talk to us...

Futuresource Consulting
+44 (0) 1582 500 100
info@futuresource-hq.com
www.futuresource-consulting.com

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