Future of TV Distribution

Early market report to Government

Welsh version available

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Section

1. About this document

1.1 In its April 2022 White Paper, 'Up next - the government's vision for the broadcasting sector', DCMS set out that it would ask Ofcom to undertake an early review of market changes that may affect the future of content distribution on digital terrestrial television (DTT) and other distribution platforms.

1.2 In September 2023, the Government announced the launch of its review of the future of TV distribution to which Ofcom's early market review will contribute. The Government work highlighted a particular focus on the services which underpin universal availability of public service content – DTT (known as Freeview) and Freesat.

1.3 Following this announcement, we issued a Call for Evidence (CfE) in October 2023. This report represents our early review of the market developments in TV distribution. It is informed by the 66 responses to our CfE and analysis of internal and external research into audience behaviours, commercial dynamics, and related policy issues.

1.4 This report sets out:

- How different audience groups are changing their viewing patterns and platforms;
- How broadcasters are responding in the way they distribute content and the prospects for and sustainability of distribution platforms;
- How broadband availability and take-up would need to increase to support any greater reliance on these networks from TV audiences;
- How some audiences risk being left behind by inaccessible devices and interfaces;
- The interdependence of TV infrastructure with radio and emergency broadcast systems, as well as other sectors who have a stake in the infrastructure or radio spectrum used by DTT; and
- Areas where further work or coordination may be desirable.

1.5 We highlight the broad directions of travel that could sustain the universal provision of TV, and in particular public service broadcasting, and the complex policy challenges involved in designing a future model that is both universal and sustainable. We also set out further work that can contribute to the public debate on these questions, and the Government's ongoing review.

1.6 Changes to the way TV is delivered over the next decade will be relevant for several of Ofcom's statutory duties. We license and regulate the Public Service Broadcasters (PSBs)[1] who are required[2] to provide their main public service channels over DTT. We have duties that require us to have oversight of competition in broadcasting networks and services, including Arqiva's transmission services. We also have duties to secure the optimal use of radio-spectrum, to promote the availability of high quality, resilient broadband networks, and duties relating to media and digital literacy.

[1] The PSBs are the BBC, S4C and the providers of the Channel 3 services, Channel 4 and Channel 5.
[2] Under the Communications Act 2003 or, in the case of the BBC, the BBC Agreement.

Key terms

1.7 The following list of key terms explains some of the terminology we use throughout the document.

Table 1: Key terms

Term	Definition for this report
DTT	Digital terrestrial television (DTT) has been the most popular way to receive TV in the UK since the digital switchover. Also known to audiences as Freeview, it sends TV content to premises over radio spectrum via an aerial.
Linear TV	Refers to content that is broadcast according to a schedule. It can be watched either live (at the time it is scheduled) or delayed by pausing live TV or using a recording device. It excludes on demand/streaming services.
IPTV	TV-like content delivered over the internet, including on-demand streaming services and internet-based linear propositions.
Hybrid	Used to describe access to both DTT/satellite/cable and IPTV. This can be achieved in a number of ways including via a user interface which combines access to DTT and IPTV, or supplemental access to IPTV such as through a 'smart stick'.
Platform	Refers to a specific distribution method, such as DTT, IPTV, satellite or cable.
Free-to-view TV	TV that is available for reception without a charge other than the TV Licence fee. Free-to-view television is provided primarily through two platforms: (i) a DTT-based platform, marketed as Freeview, and (ii) Freesat, delivered by satellite. More recently, free-to-view TV is becoming increasingly delivered over broadband (and charges are payable for the broadband service).
Universality	The ability of people of all backgrounds to access TV content which is valuable to them, through which they are connected to others across the UK. Universality ensures not only that everyone has ready access to a reliable source of news and information, but also to a range of differing opinions and cultural experiences of life in the UK.
Accessibility	The extent to which all users, including disabled people, are able to have equivalent access to a product or service.
Usability	An umbrella term encompassing both traditional TV access services (e.g. subtitling and audio description) and the ease of use of a TV user interface for all audiences.

2. Executive summary

The way TV reaches audiences will need to adapt to their changing needs and futureproof universal access

2.1 TV has an important place in most of our day-to-day lives – for entertainment, to learn about the world and, for many, as a source of company. Free-to-view TV[3] services are available universally, with over 99% of UK households able to get Freeview, Freesat, or both. While TV has had a place in our homes for over 80 years, the way we watch and choose content has always evolved. Innovation has allowed our TV ecosystem to reach different generations and develop an ever-expanding choice of programming.

2.2 Underpinning this innovation has been careful planning to give people the support they need to take up a new technology. For example, the launch of Freeview took the number of channels on terrestrial TV from five to dozens. But this required a massive industry, Government, and regulatory effort to design and deliver the Digital Switchover over a seven-year period.

2.3 TV distribution is changing radically again, as most audiences now enjoy some form of IPTV[4]. Industry and audiences expect this shift to online TV to continue, creating a range of challenges and opportunities for viewers and the TV industry. The Government has asked Ofcom to prepare an early review of the market changes that will need to be considered to ensure that the TV distribution ecosystem can continue to serve the different audiences who rely on TV.

2.4 This document sets out our early market report, which finds consensus amongst stakeholders that TV services should continue to be universally available, with a strong public service media proposition, but also a range of views on how best to futureproof these outcomes for audiences.

Viewing habits will continue to evolve over the next decade, though faster for some than others

2.5 The last ten years have seen a significant shift in audience behaviour. The take-up of in-home broadband has unlocked the launch of streaming services and opened up audiences to more content than ever before. Smart TVs and internet-based TV platforms have also brought functionalities like pausing live TV and on-demand content to the mass market.

[3] TV that is available for reception without a charge other than the TV Licence fee. Free-to-view television is provided primarily through two platforms: (i) a DTT-based platform, marketed as Freeview, and (ii) Freesat, delivered by satellite. More recently, free-to-view TV is becoming increasingly delivered over broadband (and charges are payable for the broadband service).

[4] TV-like content delivered over the internet, including on-demand streaming services and internet-based linear propositions.

2.6 Millions of people have relied on the main free-to-view technologies for many years: both Freeview, which is delivered over Digital Terrestrial Television (DTT)[5] masts, and 'Freesat' (delivered direct-to-home to satellite dishes). They offer audiences a familiar interface and a wide range of TV channels.

2.7 But with an increased choice of alternative viewing options to traditional broadcast channels, the average person in the UK spent 25% fewer minutes per day watching broadcast TV in 2023 than in 2018. However, that change has been at a different pace for different groups of people.[6]

- Some (especially younger) audiences now only watch content over the internet, and little linear TV[7]. Around 5.3m households[8] solely access TV over the internet.
- Most audiences (around 17.9m households) are 'hybrid[9] viewers' and enjoy the best of both worlds: supplementing viewing of traditional TV channels with on-demand and scheduled content over broadband.
- There are then audiences who solely rely on DTT or Freesat for their TV viewing – around 3.9m households. These households are more likely to include people who are older, less affluent, or have a disability.

2.8 The combined effect of these changing audiences is that viewing of scheduled TV channels through DTT and satellite is forecast to drop from 62% of viewing of total long form programmes[10] in 2023 to 28% by 2035, and 22% by 2040.[11]

2.9 Much of that remaining viewing will be done by the minority of households which rely solely on DTT. These trends are causing mounting pressure on the broadcasting sector to reach audiences in all the different places they expect to be served.

The consensus in the broadcasting industry that DTT should continue indefinitely has broken

2.10 Broadcasters are looking to meet modern audience expectations while distribution costs both over broadband and traditional infrastructures like DTT are rising. As the time audiences spend on DTT declines, it becomes much less cost effective per viewer to serve those who remain on it. As such, a large number of broadcasters and DTT stakeholders have told us that they anticipate a tipping point at which it is no longer economically viable to support DTT in its current form.

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[5] Digital terrestrial television (DTT) has been the most popular way to receive TV in the UK since the digital switchover. Also known to audiences as Freeview, it sends TV content to premises over radio spectrum via an aerial.
[6] Average daily minutes of broadcast TV viewing, all individuals, Barb 28-day consolidated viewing on TV sets only. Barb defines 'broadcast TV' as scheduled TV on linear channels or recorded from linear channels.
[7] Linear TV refers to content that is broadcast according to a schedule. It can be watched either live (at the time it is scheduled) or delayed by pausing live TV or using a recording device. It excludes on demand/ streaming services.
[8] See figure 7, Section 3 of this document. 3 Reasons, MTM analysis, 2024.
[9] Hybrid is used to describe access to both DTT/satellite/cable and IPTV. This can be achieved in a number of ways including via a user interface which combines access to DTT and IPTV, or supplemental access to IPTV such as through a 'smart stick'.
[10] 3 Reasons defines long form video as professionally-produced video content on TV channels and streaming video services (excludes YouTube and social video on services like TikTok).
[11] Figure 8, 3 Reasons, MTM analysis.

2.11 To date, the significant migration of audiences online has been organic. Were this to continue without coordination, cumulative decisions by audiences, channels, platform[12] providers, and key investors could leave the DTT platform under-supported. If the key stakeholders who sustain the DTT ecosystem[13] see a weaker case for new investment, they are likely to seek changes that reduce the costs of distribution. This could mean for example the removal of high-definition (HD) services from Freeview or reducing the number of channels the platform can broadcast – but without the support for audiences who rely on DTT to seek those services over the internet.

2.12 An 'unmanaged transition' like this, where the status quo is allowed to continue without intervention, would mean that the audiences who rely on DTT could face a decline in the range and quality of choice. Market and financial pressures are likely to increasingly force difficult decisions over the way TV is distributed for TV platforms, broadcasters, and the Government. Without a clear vision and careful planning for the long term that includes all audience groups, these decisions could cumulatively weaken the level of provision, and threaten the universality[14] of public service TV.

There are three broad approaches to the future of DTT for industry and Government to consider

2.13 Taken together, we have found that the current market conditions for DTT risk delivering less well for the audiences that rely on it over the next 10-15 years, and that key stakeholders are concerned about its sustainability as a primary distribution model for the long term. Below we set out three broad approaches that could be taken – noting that each of these contains a range of possible models within it. All of these approaches involve commercial or public policy trade-offs, and distinct challenges, which we explore further in Section 8.

- **Investment in a more efficient DTT service:** If it is considered that the DTT platform will deliver sufficient scale of audiences over the 2030s, or a managed transition away is undesirable, then a more efficient but full DTT service could be considered if ongoing investment or funding could be sustained. We discuss the pressures on commercial funding in 4.15-4.32 below. This may well include supporting audiences with new equipment for more efficient broadcast signals.
- **Reduce DTT down to a core service (known as a 'nightlight'):** The DTT service could maintain a minimum number of core channels (for example, the main public service channels). This could be done as a temporary transition to a fuller switch off, or remain indefinitely as a provider of last resort. This would make running the infrastructure cheaper overall but spread across fewer users. Co-users such as FM/DAB radio could remain, which also then provide power-resilient broadcasts in emergency situations.

[12] Refers to a specific distribution method, such as DTT, IPTV, satellite or cable.
[13] DTT services involve a complex set of relationships where the masts are operated by Arqiva, several 'multiplex operators' transmit a package of channels, and individual broadcast channels bid for (or, in the case of PSBs, may be reserved) capacity on the multiplex. The BBC, ITV and C4C are all both multiplex operators and broadcasters.
[14] The ability of people of all backgrounds to access TV content which is valuable to them, through which they are connected to others across the UK. Universality ensures not only that everyone has ready access to a reliable source of news and information, but also to a range of differing opinions and cultural experiences of life in the UK.

- **Move towards DTT switch-off over the 2030s:** A planned campaign to support people in getting connected and confident with internet TV services could facilitate a DTT switch-off. This would take careful planning to ensure universality of public service broadcasting and that no one was left behind, but would also have wider benefits for digital inclusion.

2.14 For any of the approaches, a clear and timely vision is important to ensure that audiences are supported, and to give certainty to investors. Options which rely either on replanning the DTT broadcast frequencies, or a complex initiative to rollout and increase take-up of broadband, would take 8-10 years to plan and execute. With many multiplex licences expiring in 2034, and some sooner, the need for certainty about the future approach to DTT by 2026 is increasingly pressing, in line with the Government's current planned work.

Driving take-up of broadband connections is the predominant challenge to changes to the DTT platform

2.15 Regardless of the scenario, whether by gradual increase or a managed migration, there will be increased reliance on the UK's networks for video streaming in the future. Technological innovation and ongoing investment in internet infrastructures will be needed to manage the load on networks and higher peaks from linear TV viewing.

2.16 Availability of superfast and gigabit broadband is not yet ubiquitous but, with planned commercial and Government investment, it is projected to reach equivalent levels of availability to any TV network. But it is the take-up, rather than rollout, of broadband that would present the largest barrier in the case of a full or partial switchover to IP delivery.

2.17 Without intervention, there will likely remain a cohort of people who do not take up broadband because they do not have the means, skills, or interest to do so. To ensure any partial or full managed switchover is as inclusive as possible, Government, industry, and Ofcom would need to work together to design a scheme which provides significant consumer support. Designing this scheme would be complex but there would be wider societal and economic benefits to increased digital literacy and connection to the internet.

Accessible and useable IPTV interfaces will be critical for large-scale adoption

2.18 DTT has generally provided audiences with a simple to use interface including a remote with buttons for channel numbers, subtitles, and audio description and a channel list guide. For those who have lower levels of digital literacy, IP-based platforms can be confusing and are largely taking design inspiration from 'smartphone' style app interfaces. As consumption of content moves online, there is a risk that some people are left behind due to the challenge of adjusting to more complex and diverse user interfaces. However, IP-based interfaces also open up opportunity for creative and sophisticated approaches to usability[15] and

[15] An umbrella term encompassing both traditional TV access services (e.g. subtitling and audio description) and the ease of use of a TV user interface for all audiences.

accessibility[16]. No matter how distribution is approached, widely usable and accessible interfaces will be needed to be inclusive of all audiences.

Stakeholders have called for a more coordinated, cross-sector effort to distribute TV in future

2.19 Stakeholders told us that certainty is needed to plan for the future of TV distribution without leaving any audiences behind. Certainty will also aid those who will need to attract investors and plan future broadband or terrestrial TV infrastructure. Stakeholders also noted the trade-offs for Government when considering policy design choices for the future, which will need to balance the benefits and risks in working to sustain the current levels of universal access to TV.

2.20 To address some of the cross-sectoral issues that impact the future for TV distribution, many stakeholders envisage a significant coordinating role for Government and Ofcom, especially for issues which cut across different sectors (such as on broadband take up campaigns, changes to TV equipment, or managing broadband network peaks from multiple sectors). Cross-sectoral collaboration will be necessary no matter the final approach chosen by Government. The Government has announced a programme of work on TV distribution, which will include considering the findings of this report before setting out its preferred approach.

2.21 Ofcom will continue to support Government in this work, both through further analysis and through the development and use of appropriate regulatory tools to help implement its final decision. We summarise Ofcom's ongoing related work under our duties in Section 8 (paragraph 8.32).

[16] The extent to which all users, including disabled people, are able to have equivalent access to a product or service.

3. Audience behaviours

Viewing habits are changing and becoming more diverse

3.1 People in the UK spend on average almost four and three-quarter hours a day watching video content on a range of devices. The makeup of this time has changed significantly, especially for some groups in society. Within all video content, broadcast TV has shown a consistent decline in viewership in recent years[17], due to a combination of factors:

- The growth of shorter-form (10 minutes or shorter) content at the expense of the viewing of long-form TV programmes;
- The growth of on-demand programming at the expense of the viewing of scheduled content; and
- The growth of the consumption of scheduled programmes over the internet rather than broadcast infrastructure.

3.2 This section assesses the impact of each trend, before looking at their cumulative impact on audiences' use of different TV distribution platforms.

Broadcasters are competing with a range of content providers for viewers' attention

3.3 Competition for people's attention has grown from outside broadcast TV over the last 10 to 15 years, be it from either video sharing and social media platforms (such as Facebook and TikTok), or even gaming platforms.

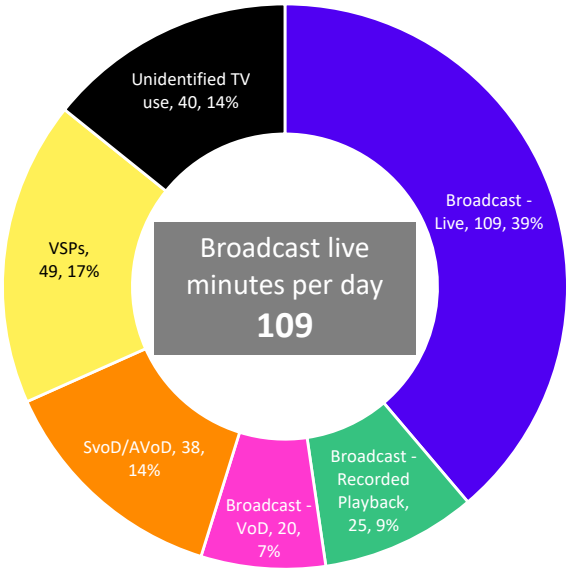
3.4 Considering video content across devices, over time technology developments have offered new alternatives to scheduled TV programming (known as 'linear TV'). In particular, viewing of content from video sharing platforms (VSPs) like YouTube has grown. Data from Enders Analysis show that, in 2018, 35 minutes were spent per person per day viewing YouTube and other online videos, compared to 54 minutes in 2022.[18] Barb data indicates it has continued to grow since 2022.

3.5 Figure 1 below sets out the average consumption of video content across the population on all devices. This sets the wider context of current video consumption habits before the report moves to focus specifically on video consumption on TV sets. As shown below, broadcast TV live is still the most popular way to consume video on average, accounting for 39% of all video viewing in 2023. Additionally, VSP and subscription video-on-demand (SVoD)/advertising-supported video-on-demand (AVoD) viewing also make up a significant proportion of video viewing (at 17% and 14% respectively).

[17] With the exception of 2020, which was impacted by pandemic-related restrictions. Barb as-viewed, all measured video viewing in the home. 'People' refers to all individuals as measured by Barb (aged 4+). Viewing is included for all devices in the home.

[18] Video viewing forecasts: Broadcasters under half of viewing by 2028, Enders Analysis.

Figure 1: Average daily minutes of all in-home video viewing across all devices, all individuals, 2023



Source: Barb as-viewed. Individuals (age 4+), across TV and other devices in the home where they are connected to the Wi-Fi. Of the 20 minutes of viewing to broadcaster VoD, less than one minute is watched live, at the time the programming is being broadcast on the linear channel.[19]

Consumption of long form content has changed

3.6 Within the TV programmes and films that we do watch, some viewers are choosing to watch on demand rather than to a schedule. Broadcasters are also taking a smaller share of that viewing with 38 minutes of viewing per person per day going to online providers like Netflix and Disney+, who are funded by a combination of subscriptions and now, increasingly, advertising. This is an increase from 5 years ago where less than half an hour a day of SVoD content was viewed.[20]

3.7 The bulk of broadcaster viewing is still delivered by traditional mechanisms (i.e. DTT/satellite/cable), but viewing to broadcaster video-on-demand (BVoD) services has been steadily increasing over the last few years, growing from around 4% of total broadcaster viewing in 2018 to 13% in 2023 (and 7% of all viewing as shown in Figure 1). Part of this has replaced viewing that was done on personal video recorders (PVRs).[21]

[19] This is not directly comparable to 2022 data in Ofcom's Media Nations report 2023 because it does not include out of home estimates, as the Media Nations one does. The estimates in Media Nations also split out the 'other video on TV sets' more. 'Other video on TV set' here includes viewing of some SVoD/AVoD/VSP services that cannot be definitely measured. The 'Other' category also includes EPG/menu browsing, viewing when the audio is muted, DVD/VHS, gaming on the TV set, some unmeasured broadcast channels, piracy, unmeasured boxsets/pay-per-view content, and non-video internet activity through a PC or other device connected to the TV. SVoD excludes viewing of NOW, which is captured within BVoD along with Sky Go (these two services stream the same content, meaning that measured viewing cannot be separated).

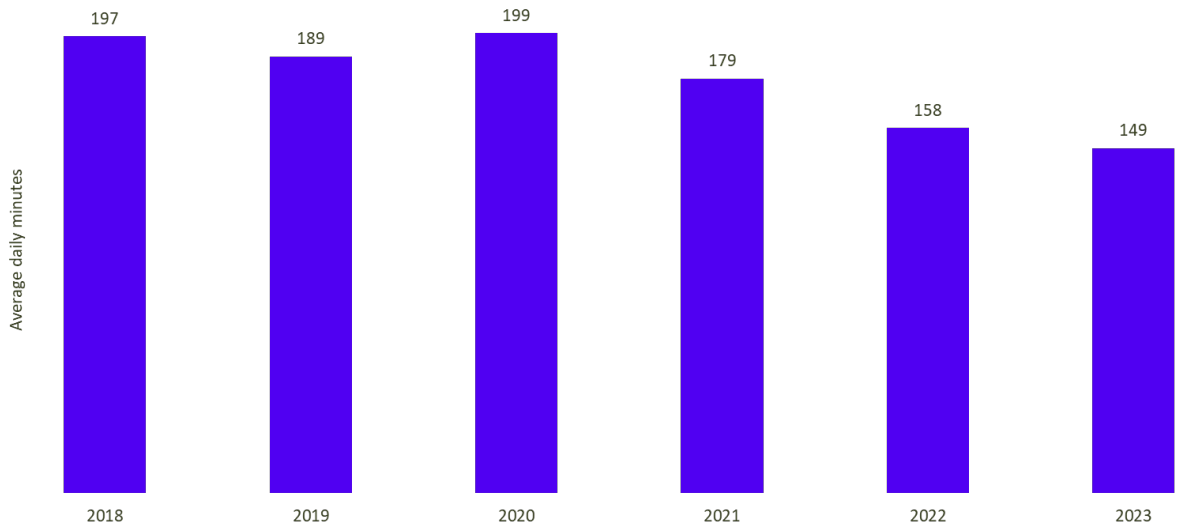
[20] 2023 figures: Barb as-viewed, all individuals (4+), all devices in the home. The comparison with 2018 used Ofcom estimates modelled from Barb, Comscore and IPA TouchPoints.

[21] 2023 Barb as-viewed, all individuals (4+), all devices. The comparison with 2018 used Ofcom estimates modelled from Barb, Comscore and IPA TouchPoints.

Viewing of broadcaster and linear content is declining but remains important

3.8 Despite the increase in viewing of short-form and SVoD platforms, we estimate that traditional broadcasters overall still account for 55% of total video viewing, and live viewing (watching at the time the content was broadcast) accounts for most of that viewing (as shown in Figure 1). However, viewing of broadcast TV has changed significantly over time: see Figure 2 below.

Figure 2: Average daily minutes of broadcast TV viewing, all individuals, 2018 – 2023



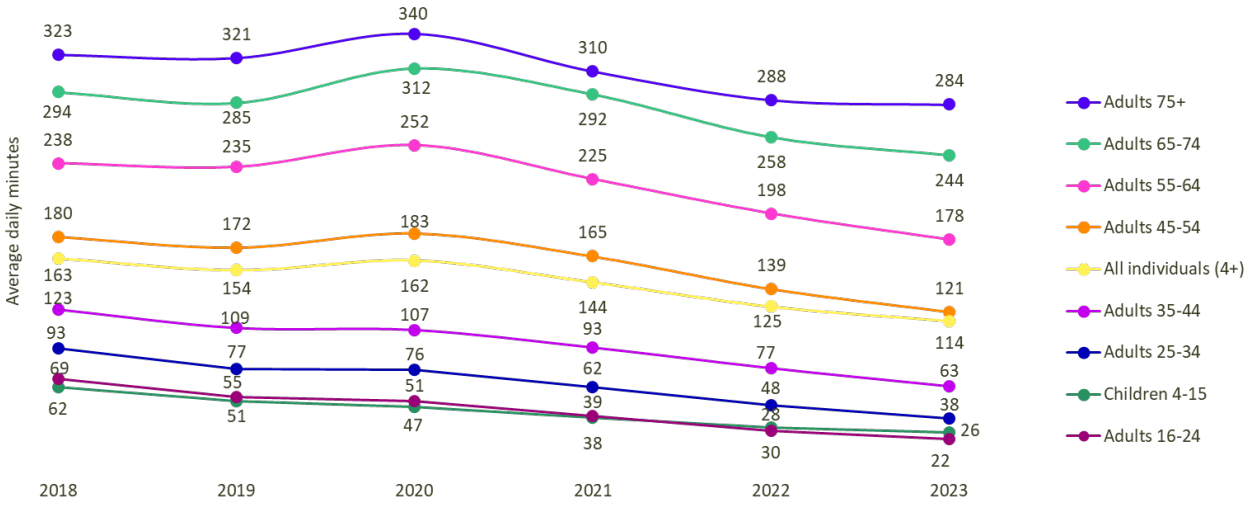
Source: Barb 28-day consolidated viewing on TV sets only.

3.9 Non-live broadcaster viewing is done on a PVR, or increasingly in broadcaster apps or integrated into a smart-TV guide through features such as 'pause' or 'restart from beginning'. But it cannot be delivered by traditional broadcast infrastructures. As this functionality becomes expected and widely adopted alongside other benefits such as higher definition content, many audiences may more often find that a hybrid system better suits their needs and expectations for watching TV. The benefits to audiences of hybrid consumption are highlighted by several of our stakeholders in their responses to our Call for Evidence.

Significant live TV viewing remains, and varies considerably by age

3.10 Just under two hours of broadcast TV was still viewed live on the TV set, per person, per day in 2023. This was a 30% decline since 2018 when it was nearly two and three-quarter hours. Viewing of live TV varies considerably by age and in recent years there has been an overall decrease in viewership across all age demographics (Figure 3). However, this has been a slower decrease in the over 65 cohorts, who also spend the most time watching broadcast content.

Figure 3: Average daily minutes of live TV viewing, by age group, 2018-2023



Source: Barb live, TV sets only. All individuals (4+). These trend figures are taken from different Barb data to that in the total AV chart in Figure 1 so the exact figures are not directly comparable.

3.11 All age groups show a shift away from live TV viewing and this is happening faster for younger demographics. In general, younger audiences watch less linear TV and more content on video sharing and on-demand platforms. Children between the ages of 4-15 watched nearly 1 and a quarter hours of VSPs and less than half an hour of live TV on average per day in 2023.[22] This is predicted to move up with the cohort as they age, and by 2028 some commentators expect that those aged 16-24 will only watch 13 minutes of live broadcast on average per day.[23]

3.12 All of these trends are also affecting older audiences to some extent, as those over 75 now increasingly watch more BVoD content, with an increase of 33% year-on-year to an average of 12 minutes per person per day in 2023.[24]

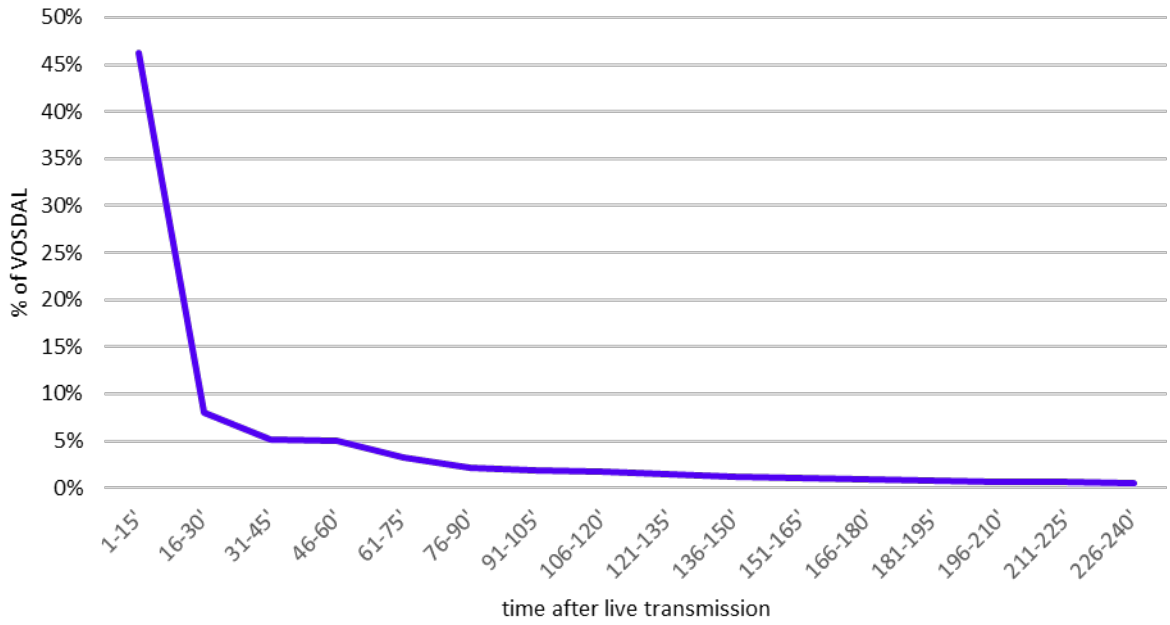
Live TV remains important especially for key sporting and cultural events

3.13 Despite the explosion of content choice and new functionality, we spend a large amount of time watching linear TV. It makes up a significant proportion of total video viewing, with 1 hour and 49 minutes a day of the 4 hours and 41 minutes total video minutes viewed (39% of it) on average by individuals in 2023 being live TV (Figure 1).[25]

3.14 The demand for scheduled content is higher than indicated by live viewing figures alone. Content that is viewed on-demand is often watched close to the original broadcast. It is easy to think of all on-demand viewing as detached from the schedule entirely. In fact, of all the viewing that takes place on the TV set either from recorded playback or catch-up on-demand services, almost a quarter (23%) happens within 15 minutes of the content being broadcast, rising to half which takes place on the same day as the original broadcast.

[22] Barb as-viewed.
[23] Video viewing forecasts: Broadcasters under half of viewing by 2028, Enders Analysis.
[24] Barb as-viewed, adults aged 75+.
[25] Barb as-viewed, all individuals (4+), all devices for average live viewing per person, per day.

Figure 4: Percentage of same day catch-up viewing by 15-minute time-bands after live transmission, total broadcast TV, 2023



Source: Barb, 'Viewing on same day as live' (VOSDAL), individuals 4+, TV sets only 2023.

3.15 Live TV also remains resilient in some genres as it is able to bring people together for key moments such as cultural and sporting events. The top 3 most viewed programmes watched live, at the time of the broadcast, in 2023 were the first part of the Coronation of HM The King and Queen Camilla (10.0 million viewers), New Year's Eve Fireworks (8.9 million viewers) and The Eurovision Song Contest (7.6 million viewers), with the top sporting programme in 2023 being the Women's World Cup Final (football), Spain vs England, with an average 5.9m viewers.[26] The majority of viewers still watch some live TV (as opposed to it all being recorded or on-demand) – on average in 2023, 63% of viewers watched at least 15 consecutive minutes of live TV a week.[27]

The platforms audiences use to watch linear TV are also changing

3.16 Changing habits are reflected in how audiences are choosing to access TV, and how they will do so in the future. Traditionally, linear TV has predominately been accessed through a range of free and pay-TV platforms, of which DTT has played a major part. All of these services have provided access and delivery of linear services in a simple format to audiences.

[26] Barb live viewing only (watched at the time it was broadcast), individuals (4+), via TV sets only. Includes +1 channels where applicable.

[27] Barb, live viewing only, all individuals (4+), via TV sets only, average weekly reach. Live viewing refers to watching at the time the programme was broadcast. It does not necessarily mean that it was a programme being transmitted in real time.

In recent years there has also been an increase in IP-only and 'hybrid' households

3.17 The majority of DTT viewers are and will continue to be 'hybrid', mixing traditional linear with connected viewing. As set out in Figure 5 (below) the number of households with any internet connected TV has risen from approximately 6 million households in 2018 to 12 million in 2023. Additionally, in response to our CfE, some broadcasters suggested that they anticipate most of these 'hybrid' UK households will use IP technology more often to access their content in the future.

3.18 Forecasts also suggest that households which solely rely on IP connections (without a DTT or other TV service) are growing. In 2023, 3 Reasons estimated that 5.3m households only connected their main TV sets via a broadband connection, and that this would grow to 17.8m households by 2035. We set out these figures in Figure 7 below alongside other platforms.

3.19 In recent years, new services have entered the market that have enabled this change. For consumers who have a broadband connection, online platforms like Sky Glass, FAST channels (Free Ad-Supported Streaming TV channels), and Freely[28] allow them to access IP delivered content but via a familiar electronic programme guide (EPG).

Most households now have the necessary equipment to watch IPTV, but many have yet to connect it to the internet

3.20 One popular method to watch TV via IP is through a smart TV. In its response, the BBC refers to data from 3 Reasons that projects smart TV ownership to rise from 70% currently to almost 96% by 2032.[29]

3.21 However, a significant percentage of smart TVs in the home are currently not connected to the internet. Ofcom's Technology Tracker shows that 23% of adults do not connect their smart TV to the internet through any means, whether this is through the smart TV itself, or connected equipment such as set top boxes, smart sticks, or other external devices. The BBC further estimates in its response that by 2027 the number of primary set TVs not connected will reduce to 13% by 2027.[30]

3.22 32% of adults use a set-top box to watch TV, while 17% of UK adults watch TV through a smaller smart stick.[31] For legacy TVs without 'smart' functionality, smart sticks provide an affordable alternative to upgrading TV equipment.

3.23 Take-up of IPTV will depend significantly on how simple it is to use, including to those used to traditional TV interfaces. We discuss principles around the ease of use and accessibility of the services in Section 6.

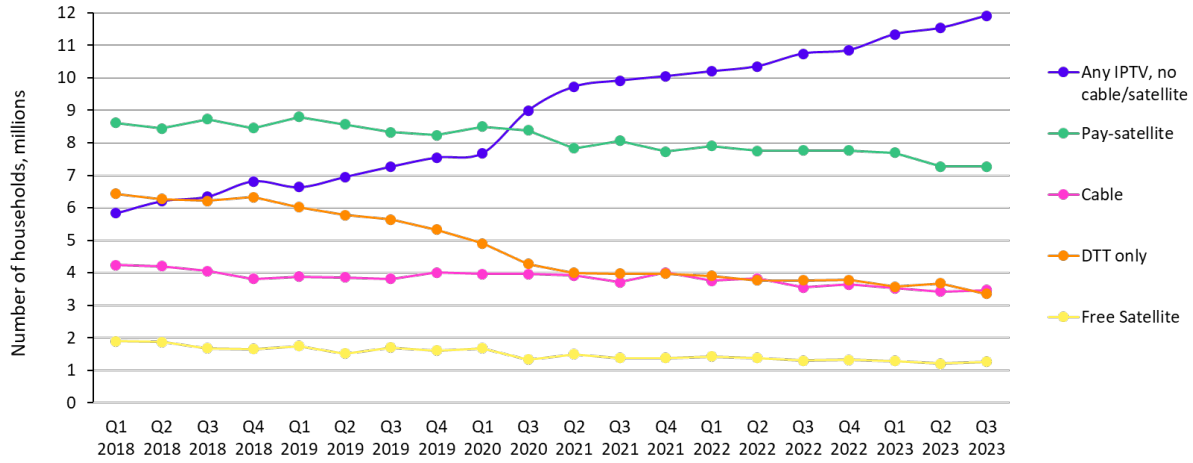
[28] A new service launched by Everyone TV allowing viewers to watch linear TV streamed over the internet.
[29] BBC response to CfE, pg.7.
[30] BBC response to CfE, pg.7.
[31] Technology Tracker 2023, Ofcom.

The remaining number of homes solely reliant on DTT for their TV services has fallen, but remains in the millions

3.24 According to the Barb Establishment Survey, 13.2m households in total had DTT connected to the main TV set in 2023. The majority of those already had an internet connection to their smart TV or box. However, 3.3 million UK households (5.1 million individuals) only had DTT to access any TV services.[32]

3.25 This figure is gradually falling over time, in part as more people take up broadband services, and in part due to generational turnover. But the group of viewers solely reliant on DTT will remain in the millions for many years to come, absent any change in current trends. We discuss barriers to broadband take-up in Section 5.

Figure 5: Number of households with each TV platform/connection, millions, Q1 2018 – Q3 2023



Source: Barb Establishment Survey. 'DTT only' refers to those households who have an aerial and not any other TV platform or internet connection to the TV. The other platform figures are not exclusive of each other. 'Any IPTV, no cable/satellite' refers to all households that have any kind of internet connection to their TV (including via a Smart TV, BT vision/YouView, connected via a computer/games console etc), and do not also have cable or satellite.

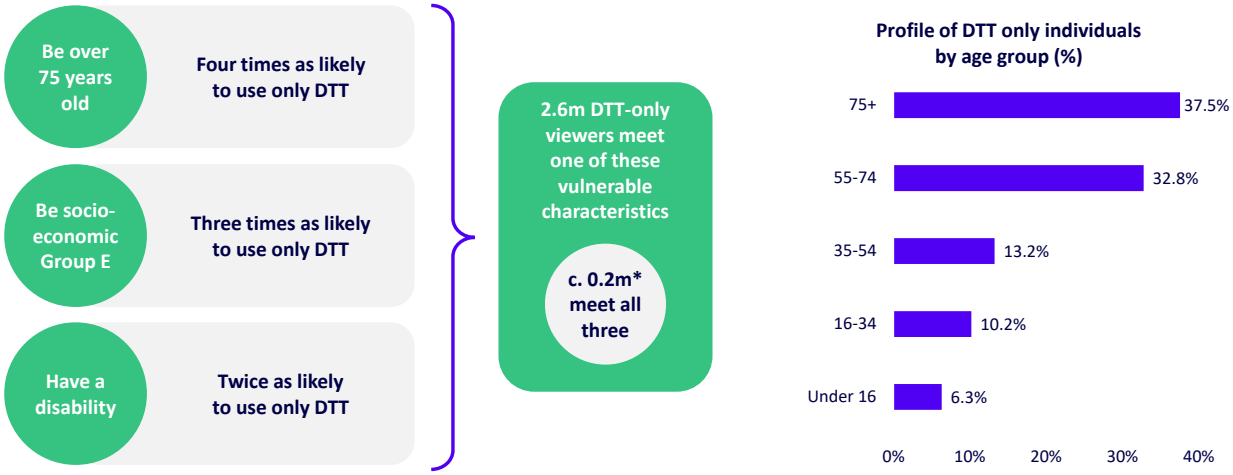
3.26 This means that, absent intervention, there will remain households who are unable to access linear TV in any other way or who choose to continue using DTT despite other options being available. In response to our CfE, stakeholders generally agreed with this but there were differences in expectation around exactly how many DTT viewers will remain. A figure provided from one broadcaster suggests that DTT will still be the primary way of accessing TV for 10 million households by 2030. The BBC cites 3 Reasons projections which say that the number of households that use DTT will significantly decrease in coming years and additionally suggests that the figure of DTT-only households that are also unconnected will decrease to 2 million households by 2030.[33]

[32] Barb Establishment Survey Q3 2023. DTT only refers to those households who have an aerial and no other TV platform/service or internet connection to their TV set.
[33] BBC response to CfE, pg.9.

DTT-only viewers may be more vulnerable to being left behind

3.27 DTT-only viewers[34] are more likely to be older, from a lower socioeconomic group or have a disability. This was flagged in numerous stakeholder responses to our CfE. In particular the BFI highlighted how the average age of DTT viewers has risen from 48 in 2010, to 62 in 2023.[35] We set out data on the demographics of DTT households in Figure 6 below. These characteristics mean that they may face barriers to broadband or IPTV take-up, and require assistance to make a transition from DTT to IP. These barriers and our proposals for further work to understand them are discussed in Section 5.

Figure 6: The likelihood of individuals living in DTT-only households having certain characteristics, compared with the UK population, 2023



*Source: Barb Establishment Survey Q3 2023. *The sample size for the number of people who meet all three characteristics is relatively low and therefore should be treated with caution.*

3.28 Separately, there are differences within the UK on household reliance on DTT. Out of the total 3.3 million (11.7%) DTT-only households within the UK, Northern Ireland has the highest proportion out of the nations at 15.8%. England is on par with the UK average at 11.9% and Scotland and Wales are both below the UK average (9.9% and 9.5% respectively). Additionally, satellite is significant in some areas with Wales having the highest percentage of households with any satellite offering at 38%.[36] In response to our CfE, S4C flagged that satellite is the most popular primary-TV device distribution method in Wales.[37]

3.29 There is also variation within the English regions. The North West had the highest proportion of DTT dependent households at 16.3%, while London is lower than the UK average at 9.3%.[38] In response to our CfE, some stakeholders also flagged that DTT continues to be an important platform for audiences to discover content from and about the nations and regions as a key tenet of public service broadcasting.

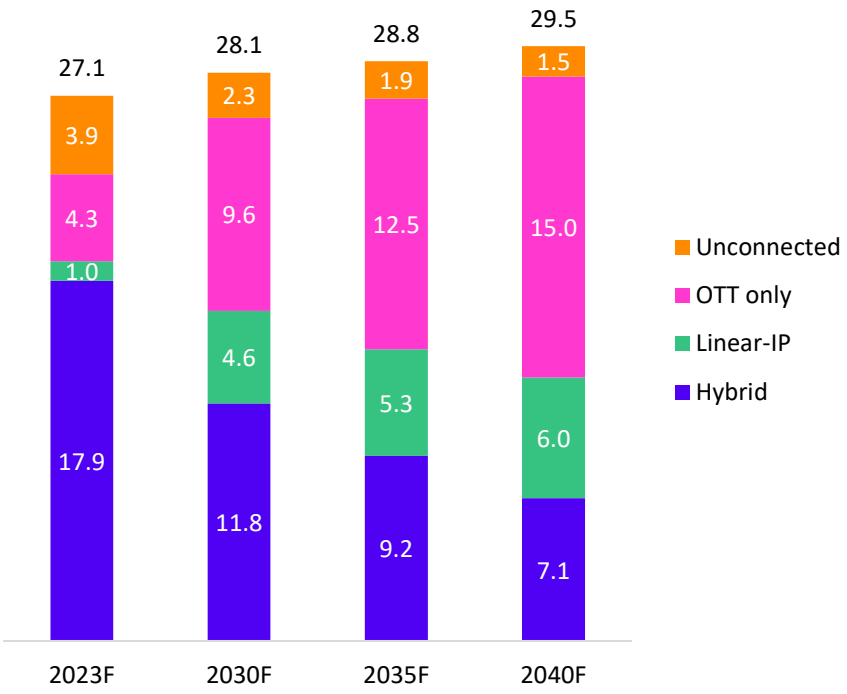
[34] DTT-only in this section refers to those who have an aerial and do not have satellite, cable or any internet connection to their TV set, meaning they are reliant on the DTT service to watch any TV.
[35] BFI response to CfE, pg.6.
[36] Barb Establishment Survey Q3 2023.
[37] S4C response to CfE, pg.5.
[38] Barb Establishment Survey Q3 2023.

Projections suggest that the decade ahead will see significant reductions in the numbers of households solely reliant on traditional broadcast infrastructures

3.30 The combination of changing audience habits and platform dynamics means that TV viewing and distribution could look very different in the future. In response to our CfE several consumer groups and individuals suggested that a significant proportion of audiences, especially those 75+, will continue to use DTT based on current take up.

3.31 Figure 7 shows a forecast from 3 Reasons that suggests that by 2035 94% of households will have a TV which is connected to IP-delivered video, and households who solely use IPTV technologies will make up approximately 62%.[39] These forecasts are made on the basis of existing trends in broadband rollout, and with an expectation that DTT services continue in their current form over the period.

Figure 7: Forecast of number of UK homes by primary TV UI type, millions, 2023 – 2040[40]

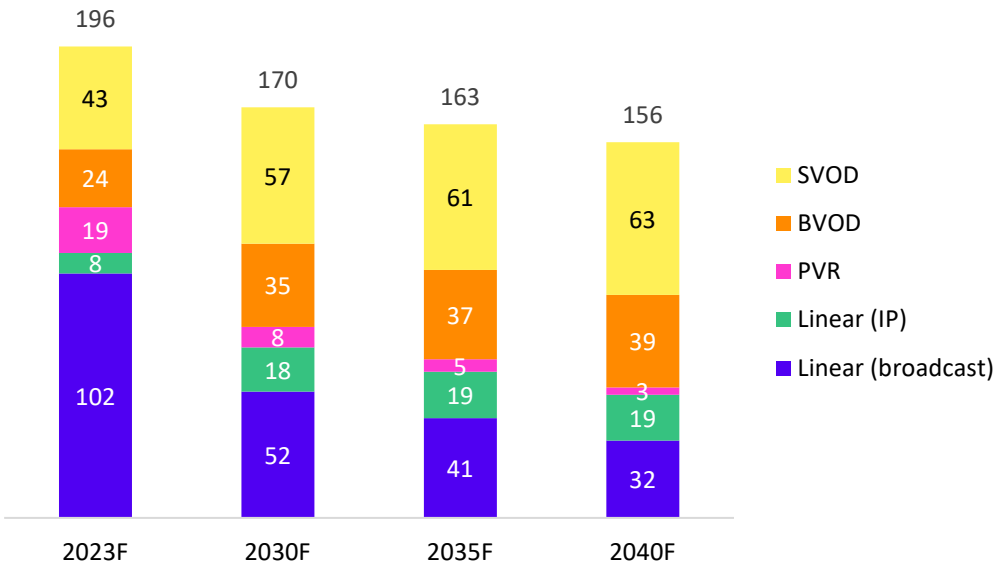


Source: 3 Reasons, MTM analysis. 'Unconnected' for the purposes of this forecast refers to a TV set that has no connection to IP-delivered video and relies entirely on linear broadcast deliver, mainly from DTT or Freesat.

3.32 Looking at how each of these groups and different demographics consume TV today, it is possible to project how the changes in primary TV platform will flow through to viewing volumes in the future. Forecasts from 3 Reasons in Figure 8 suggest that time spent viewing linear content over DTT and satellite broadcast platforms could halve by the end of the decade, and represent a smaller proportion of long form viewing through the 2030s.

[39] 3 Reasons, MTM analysis.
[40] In this instance, 3 Reasons uses UI to mean User Interface.

Figure 8: Forecast of viewing of content type, daily minutes per person, 2023 – 2040



Source: 3 Reasons, MTM analysis.

Summary of stakeholder responses

All the respondents highlighted that audience viewing habits have changed in recent years. Additionally, there was broad agreement on the importance of the fall in linear TV viewing, and increase of online viewing as a primary factor in considering the future of TV distribution.

There was agreement across the respondents that DTT-only viewers are more likely to have vulnerable characteristics, and some may never transition to IP. Consumer groups and individuals flagged the importance of ensuring that this group of viewers can still access content.

Most respondents said that some viewers have already transitioned to IP but there were different views on the number of viewers who will continue to use DTT in some way. Most broadcasters and ISPs suggested that this number will significantly decrease whereas some set manufacturers and other respondents suggested that there will not be a significant change from current figures.

Some respondents highlighted the benefits of IP such as increased functionality and HD for consumers, who are increasingly beginning to expect this. Other respondents maintained that DTT delivered content was more robust and reliable.

4.Market dynamics

4.1 Section 3 discussed how the way most people are watching TV content is changing. Broadcasters, and the platforms that bring them to audiences, are having to adapt to these changes in response.

4.2 Our Call for Evidence asked for views on what audience trends mean for the financial prospects and sustainability of distribution platforms, and how broadcasters' strategies are evolving to respond. In this section we set out the challenges they are likely to face into the next decade.

The number of platforms that content providers can use to distribute their TV content has expanded

4.3 Audiences benefit from the choice of watching TV content over a number of distribution platforms, including DTT, satellite, cable and more recently internet-delivered platforms and apps. Each of these deliver content using different distribution technology and infrastructure, and households require different receiving equipment in the home depending on which platform they use.

4.4 For broadcasters and content owners, being on these TV platforms allows them to reach audiences and, in the case of commercial channels, secure advertising, subscription, or other revenues.

4.5 DTT and satellite platforms are used by broadcasters to deliver linear TV channels and radio stations and continue to give broadcasters near-universal coverage of UK households.

4.6 Meanwhile, there has been a proliferation in the number of online-only platforms that audiences use to consume linear and on-demand TV content. These include services from existing platform providers (e.g., Sky Glass), native user interfaces on connected TV sets, as well as games consoles and other services (e.g., Amazon Fire).

4.7 Many platforms are also 'hybrid', offering both IP connectivity alongside DTT or satellite delivery, and access to a mix of standard definition (SD) and high definition (HD) channels as well as on-demand content, and other functionality. These hybrid platforms include Freeview Play, Sky Q, YouView, and some connected TVs.

For broadcast channels, there are increasing benefits to distributing their content over the internet

4.8 Broadcasters have invested in recent years to ensure their services are carried on individual IP platforms, realising benefits for audiences and broadcasters.

- IP platforms enable content owners to provide catch-up and on-demand services, as well as other features that can enhance the linear TV experience including higher definition pictures and the ability to pause or restart TV programmes.
- IP functionality also allows content owners to recommend and link programmes for specific audiences to maintain audience attention, as well as enabling commercial broadcasters to target their advertising more effectively to particular audiences.

- In their evidence to us, the Public Service Broadcasters (PSBs) suggested that the potential for universal internet distribution will 'level up' provision of PSB services because, unlike broadcast with its limited capacity, it will give all audiences access to all PSB services whether live or on-demand.[41]

4.9 In the responses to our Call for Evidence, some commercial broadcasters highlighted the financial and strategic challenges of continuing to serve viewers on existing broadcast platforms, while at the same time investing in online distribution and competing to attract online audiences.

Broadcasters incur costs to distribute their channels and services on multiple TV platforms

4.10 In order to secure carriage on TV platforms, broadcasters either agree carriage terms with platform owners or pay infrastructure and delivery costs themselves. Broadcasters wishing to reach as many households as possible will typically look to be carried on multiple platforms, and incur multiple sets of distribution costs as a result. Smaller channels may be able to reach their target audiences sufficiently by being on fewer platforms, or may struggle to reach commercial carriage terms with large platform operators.

4.11 In the case of DTT, the broadcast infrastructure is operated by Arqiva which provides access to the network and transmission services via long-term commercial contracts with multiplex operators.[42] These operators in turn provide channel slots to broadcast channels and other services, either using the capacity for their own channels or sub-leasing the capacity via commercial agreements. Arqiva is subject to regulatory undertakings in relation to some of the services it offers which restrict the rate of return it can earn from the DTT infrastructure.[43]

4.12 For satellite distribution, channels can lease capacity on satellites directly with satellite operators or via third parties, including as part of carriage agreements for pay TV channels on Sky or via wholesale providers including Arqiva.

4.13 For IP distribution, broadcasters operate their own content delivery networks (CDNs)[44] or sign commercial agreements with third-party CDNs, which provide capacity to distribute content and services over the internet.

4.14 Broadcasters may carry additional distribution costs if they deliver channels or content in both SD and HD versions, or have to broadcast regional variants, to the same platforms. The

[41] Future TV Taskforce response to CfE, p.7-8.
[42] Multiplex operators hold licences to run multiplexes, which are packages of channels that are delivered together. Multiplex operators in the UK include the BBC, Digital 3&4 (owned by ITV and Channel 4), SDN and Arqiva. The full list can be found here.
[43] In September 2008, the Competition Commission accepted undertakings from Arqiva as a remedy to the lessening of competition in the provision of broadcast transmission services created by the merger of Arqiva and National Grid Wireless. Commercial disputes between Arqiva and multiplex operators are subject to review by an Adjudicator. The charges that Arqiva makes to customers must be reasonably derived from the costs of provision allowing an appropriate mark up for the recovery of common costs and a return on capital employed.
[44] A content delivery network (CDN) is a group of geographically distributed servers that speed up the delivery of web content by bringing it closer to where users are.

effects of these decisions vary by platform: for example, unlike DTT, satellite signals cannot be isolated to areas of the country and each regional variant needs a separate stream.

As the number of platforms has proliferated, many broadcasters are facing higher total costs of distribution

4.15 We commissioned MTM[45] to consider how broadcast distribution costs are changing, and also received evidence from broadcasters on the financial costs of being distributed on multiple platforms.

4.16 MTM found that the price for channels securing a broadcast slot on DTT[46] or satellite on the commercial market has reduced over the last 10 years, as demand for DTT and satellite capacity from commercial broadcasters has weakened. That has implications for the DTT platform in particular.

4.17 While channels on DTT may have seen their distribution costs fall, the costs of running the DTT network have not fallen materially. These costs are largely fixed as they do not vary with the number of households that use the platform. These running costs are borne by multiplex operators through long-term contracts (including the BBC, ITV, and Channel 4). MTM reported that as well as getting less revenue for channel slots, the costs paid by DTT multiplex operators to Arqiva have increased as inflation and higher energy prices are passed onto multiplex operators under the terms of their commercial agreements. These trends are making it less profitable to operate the DTT platform – a dynamic that will worsen if current trends continue.

4.18 As on-demand and streaming audiences have grown over recent years, so have the costs associated with delivering these services. Content providers have also incurred additional costs to meet the different technical standards and operating systems that individual online platforms use. MTM reported that investment in IP service development has increased significantly[47], and forecast that total IP delivery costs will continue to increase despite lower unit costs for IP delivery.

4.19 As a result, for broadcasters that want to be available wherever their audiences are spending their time, distribution costs are rising. For example, the PSBs stated in their joint evidence:

> "There is no way around the fact that the proliferation of TV distribution methods (with multiple different IP platforms alone) will put more and more cost pressure onto PSBs. We anticipate, for instance, that a tipping point will come for DSat and eventually DTT at which the costs of distribution outweigh the benefits. As the number of people using only terrestrial or satellite to receive television services decreases and is particularly concentrated in some parts of society, the high fixed costs of these technologies will become

[45] Report on broadcast distribution costs, MTM.
[46] Channels can secure DTT capacity on commercial multiplexes that reach 90% of the UK, by securing channel slots from SDN (on COM4) or Arqiva (on COM5 and COM6).
[47] MTM reported that investment by broadcasters in IP service development has tripled since 2014 in some cases.

proportionately higher per user and harder to meet through advertising or to justify as a responsible use of the licence fee."

Future TV Taskforce[48]

The financial pressures facing broadcasters are leading some to consider their willingness to continue to pay the costs of being on multiple platforms

4.20 Broadcasters face increasing competition for audiences' time and attention from a range of digital players including the likes of Netflix, Amazon and Apple, as well as video-sharing platforms such as YouTube. For commercial broadcasters, this has created a revenue squeeze as audiences transition to IP services where there is more competition for audiences, including from global players who are able to leverage their scale to secure content rights and programme commissions.

4.21 This competitive pressure is likely to intensify in future, particularly for commercial broadcasters funded by advertising, with big global players including Netflix, Disney and Amazon Prime introducing ad-funded tiers of their streaming services.

4.22 We also received evidence of concerns from commercial broadcasters that, while DTT and satellite remain important in delivering large audiences to commercial broadcasters, as audiences migrate to IP platforms, those viewers that remain on DTT and satellite are increasingly older and less affluent, which makes them less lucrative for advertisers.

4.23 We heard from stakeholders and the MTM analysis that over time channels may decide that the audiences they reach on DTT and satellite will no longer be large enough or valuable enough to justify the costs of maintaining distribution – particularly if they are able to secure their target audiences on other platforms or feel that investment in streaming services is a more effective route to market.

4.24 Some broadcasters are already making strategic decisions publicly that prioritise streaming services over broadcast channels on multiple platforms. For example, Disney made Disney+ the exclusive home of all Disney content in the UK following the recent closure of its broadcast channels on Sky (Disney Channel, Disney XD, and Disney Junior). ITV closed its children channel CITV in favour of streaming-only children's content in ITVX Kids.[49] Channel 4 also recently announced plans to shift its focus from traditional broadcasting to digital, including plans to close small linear channels (starting with the Box channels in 2024) and aiming to become a digital-first public service streamer by 2030.[50] Most recently, TalkTV announced that it would be closing its DTT channel in the summer of 2024 and become an online-only channel.

4.25 Taking these trends together, multiple broadcasters and channels suggested that it is unlikely to be commercially sustainable or justifiable value for money for them to continue indefinitely to pay to be on as many distribution platforms as they do today.

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[48] Future TV Taskforce response to CfE, p.9. This is the collective response from all the PSBs – BBC, ITV, Channel 4, Channel 5, STV and S4C – and Everyone TV.

[49] ITV announces closure of CITV in favour of streaming-only children's content, ITV News.

[50] Channel 4 shares plans to become digital-first public service streamer by 2030, Channel 4.

4.26 The existence of multiple TV platforms currently gives audiences a choice of how to receive their TV services whether they are connected to broadband or not. However, as more audience time is spent online, the economics of running multiple distribution networks in addition to supporting reliable high-quality streaming over the internet becomes ever more challenging for those who pay the running costs of broadcast networks.

Pressures on the affordability of broadcast distribution are particularly acute for the DTT platform

4.27 Arqiva stated in its evidence to us that the DTT network was a "cost-effective and reliable platform enabling universal delivery of free-to-view TV".[51] It referenced recent channel launches on DTT including Earth X and GB News as evidence of ongoing demand for capacity on the platform, and expects demand for multiplex capacity from broadcasters "to continue in the long-term".[52]

4.28 However, several key stakeholders in DTT took a different view. For example the BBC's evidence to us suggested that even without inflation, the cost per DTT viewer hour in 2030 will be around four times higher than it is expected to be in the financial year 2023/24.[53] As referenced in paragraph 4.19, the PSB joint response anticipates a tipping point will eventually be reached where costs exceed the benefits of being on DTT.

4.29 Taken together, a significant number of broadcasters voiced concerns in their evidence that maintaining the existing DTT infrastructure is unlikely to be commercially attractive after the mid-2030s. They stated that the DTT platform may increasingly represent poorer value for money or even become financially unsustainable.

4.30 The commercial attractiveness and financial sustainability of the DTT platform will, however, be affected by various factors in the mid-2030s. These include the timing and terms of contract renewals between Arqiva and multiplex operators, the pace of household migration towards IP and away from DTT, and the revenue prospects for broadcasters that underpin the platform, including the licence fee and TV advertising.

The market for DTT could diminish over time and leave audiences who rely on it underserved

4.31 Many stakeholders stressed the importance of retaining a national communications infrastructure that can continue to provide freely available and universal delivery of public service content. Some have argued that, despite the commercial pressures facing DTT, the platform should be supported long into the future to continue to serve the audiences that rely on DTT.

[51] Arqiva response to CfE, p.6.
[52] Arqiva response to CfE, p.20.
[53] BBC response to CfE, p.16-17.

4.32 However, any decisions by broadcasters or holders of DTT multiplex licences to step back from the DTT platform could mean fewer channels, including the removal of HD services, and less choice for those audiences that rely on DTT.[54]

4.33 A less attractive DTT platform would struggle to maintain audiences who are prepared to switch when faced with greater choice and functionality on IP and hybrid platforms. In turn, this could further increase the financial pressures on broadcasters and the cost per household of being on DTT, and the business model that currently sustains the DTT infrastructure may ultimately become commercially unviable.

4.34 These financial pressures are compounded by the current funding model for DTT, where the fixed costs of running the infrastructure are shared by all multiplex operators. If one or more operators ceased to fund the network's running costs, costs would be pushed up for the remaining multiplex operators.

There are difficult choices to take on how to continue to deliver public service content universally under the growing commercial pressures on distribution costs

4.35 Government will need to decide how far DTT should be supported as the primary means of delivering universal public service content over the long term.

4.36 All the PSBs are currently required to broadcast their main PSB channels on DTT, as part of the BBC's Agreement[55] and under the Communications Act 2003 (as reflected in the terms of the commercial PSB licences).[56] The Channel 3 and Channel 5 PSB licences have recently been renewed and will run for 10 years to 2034; the Channel 4 licence is in the process of being renewed and Ofcom has proposed the licence period also run to 2034.

4.37 The BBC, ITV and Channel 4 are also holders of multiplex licences on the DTT platform and their willingness to continue holding these licences will have important implications for the DTT platform into the 2030s.

- The BBC's Multiplex 1 (PSB1) Wireless Telegraphy Act licence runs until the end of 2027, and decisions about the future of this multiplex and the BBC's role in sustaining the DTT platform will need to be made as part of the next BBC Charter Review.
- The BBC faces a decision as to whether to continue operating Multiplex B (PSB3), which currently carries the PSB's HD services. The current multiplex licence is due to expire at the end of 2026 and the BBC has the option to renew it until 2034. The PSBs stated in their joint evidence to us that "it is possible that [closure of PSB3] could reduce costs for

[54] As we outlined in Section 3, DTT households are more likely to be in rural areas and include viewers who are older and less affluent than those who watch TV over IP – and any weakening of the DTT proposition would leave these households with a less attractive line-up of TV channels.
[55] Clause 44 of the BBC Agreement requires the BBC to continue to ensure UK households can continue to receive the UK Public Television Services in digital form through a television aerial in accordance with an agreed coverage plan, which can only be amended with approval from the Secretary of State.
[56] The Communications Act also requires that the commercial PSBs make their PSB channels available to every appropriate network and satellite services, subject to the need to agree terms. These "must offer" requirements relate to all networks that are used by a significant number of end-users as their principal means of receiving television programmes. The BBC is required under clause 61 of the BBC Agreement to ensure that users are able to access the UK Public Services in a range of convenient and cost effective ways.

PSBs while not reducing overall PSB coverage. However, this would mean audiences no longer had access to HD services on DTT if they choose to continue to use DTT rather than moving to internet TV at that point".[57]

- Looking further ahead, the non-BBC national DTT multiplex licences are due to expire in 2034. At that point, multiplex operators will have to decide if it will be commercially viable to continue paying for the running costs of DTT and to continue distributing their own channels on DTT or if there will be sufficient demand to sub-lease the capacity to other channels.

4.38 When contracts come up for renewal, there will be renegotiations of the price of network access and managed transmission services between Arqiva and multiplex licence holders. In the event the multiplex licences are extended, there will be questions over the level of capital investment needed to maintain and (if considered necessary) to improve the DTT platform to continue to meet audience expectations. If the DTT infrastructure is to be maintained over the long term, some transmitter equipment may need to be replaced as it reaches end-of-life in the early 2030s. As a result, if the multiplex licences were extended, then multiplex operators might have to fund further capital investment and commit to long-term contracts even to maintain the status quo.

4.39 Long-term certainty is an important condition to support investment by Arqiva and multiplex licensees. Several responses called for greater clarity on the future for DTT in sufficient time to plan any necessary investments.

4.40 However, we also heard evidence from some broadcasters that commercial support for the platform cannot be guaranteed after the existing multiplex licences expire; if Government considers that there is continuing public value in the DTT platform post-2034 then some broadcasters believe there may need to be public intervention to support the platform.

4.41 Indeed, our reading of the evidence suggests that, were DTT to continue operating on its current configuration, it may become financially unsustainable for those that fund the platform and may end up delivering a weaker audience proposition over time. Were DTT to remain as a primary distribution mechanism for universal TV, the industry may need to consider options to improve the platform's efficiency and functionality.

The DTT platform could develop in three broad directions into the 2030s, shaped by the decisions of Government and delivered by industry

4.42 We have identified three broad approaches to how the DTT platform may evolve into the 2030s and beyond, informed by our evidence gathering and engagement with stakeholders. These are:

- Invest in upgrading the DTT platform to deliver greater efficiency and quality.
- Slim DTT down to a lower-cost, core service to serve as a 'nightlight'.
- Set a course for full switch-off of DTT, and a managed transition to IP-only distribution.

4.43 These long-term approaches are a starting point to consider how the platform may evolve beyond the current model and the challenges it faces. The approaches take as a simplifying

[57] Future TV Taskforce response to CfE, p.9.

assumption that the ambition would be to retain the current reach and availability of the combination of DTT and DSAT, which together address over 99% of homes. We discuss the hypothetical impact of reducing that coverage ambition in Section 8.

4.44 Each approach includes a number of design questions and variants within it, and so are not full proposals or options. The approaches are also not in the gift of any one stakeholder but would require coordination across industry and Government – we discuss this coordination in Section 8. Below we discuss each approach in turn.

Invest in upgrading the DTT platform to deliver greater efficiency and quality

4.45 Some stakeholders have called for further investment in the DTT platform in order to maintain and improve its appeal to audiences and deliver greater efficiency.

4.46 All but one of the six DTT multiplexes currently broadcast on DVB-T standards.[58] Upgrading some or all of the five DVB-T multiplexes to the more efficient DVB-T2 standard would significantly increase the overall capacity of the DTT platform, allowing more services to be carried or with higher picture quality. If such an upgrade were deployed DTT could accommodate all existing channels while requiring significantly less radio spectrum to broadcast. The remaining spectrum could then be put efficiently to other uses. We discuss these uses and greater spectrum compression for DTT in Section 7.

4.47 There may be further benefits and cost savings for broadcasters from greater energy efficiency, and Arqiva stated in its evidence to us that investment in DTT could "deliver energy and carbon efficiency improvements up to 50% compared to today".

4.48 While this technology has been available for many years, the existing multiplex operators have been unwilling thus far to invest in upgrading their multiplexes to more efficient standards. Any upgrade would require upfront capital investment which could offset any savings in the costs of running the platform. In addition, a small number of homes without a TV set capable of receiving DVB-T2 signals would need help to upgrade their equipment or risk losing their TV service.[59]

4.49 Some stakeholders have suggested that investment in further capacity on DTT or DSat will never be able to match the greater functionality and choice that IPTV can offer, and it is unclear that there would be sufficient long-term demand from enough linear channels to pay for DTT distribution over and above their costs to distribute over the internet, where much of their audience will be spending a majority of viewing time.

Slim DTT down to a lower cost core service to serve as a 'nightlight'

4.50 The DTT platform could be slimmed down to offer a small number of channels (such as the main PSB services and news channels) by reducing the number of DTT multiplexes.

4.51 This approach could lower the costs of operating DTT by reducing some direct costs for broadcasters from energy savings. The service could be based on DVB-T standards (which

[58] PSB3 uses DVB-T2 standards and includes capacity used to deliver HD variants of the PSB channels.
[59] 3 Reasons forecasts that in 2030 there will be 0.2m DTT homes with a DVB-T receiver as their primary TV set and 0.9m DTT homes with a DVB-T receiver as their secondary set.

would avoid some up-front capital expense outside of necessary replacement and maintenance of masts). It could alternatively be implemented alongside an upgrade to DVB-T2 standards in order to maximise cost and energy efficiencies. In either case, reducing the number of multiplexes would as above yield at least some spectrum for alternative uses.

4.52 The design of a slimmer DTT includes a range of potential options.

- The fewer channels on the service that remain, the more attractive a move to IP platforms would be for audiences. In this scenario, a slimmer DTT serves as a 'nightlight' service to offer a minimum level of provision to those who switch over to IP last. It could therefore be transitional towards a full switch-off of DTT.
- Alternatively, the 'nightlight' could be a permanent offering to serve as a platform of last resort, providing a more limited line-up of channels to those homes persistently unable or unwilling to secure an IPTV service. This could also reduce the burden of 'peak live viewing events' (such as major sporting or Royal occasions) on broadband networks.

4.53 A universal 'nightlight' would still require maintenance of the existing DTT mast infrastructure in order to reach all UK homes, such that the majority of costs of the network would still need to be met by broadcasters and other users of the infrastructure including radio and telecoms companies. We discuss these impacts of each approach on other sectors in Sections 7 and 8.

Set a course for full switch-off of DTT, and a managed transition to IP-only distribution

4.54 The final long-term approach would be for the Government to set a vision for complete switch-off of the DTT infrastructure and a managed transition to IP-only distribution. This would involve supporting currently unconnected DTT households to benefit from the additional functionality and services available on IP platforms.

4.55 Switching off DTT entirely would save considerable costs for larger broadcasters by reducing the need to fund distribution of their services across all current platforms simultaneously – only somewhat offset by additional delivery costs for IP distribution. It could ultimately free the entire Ultra High Frequency (UHF) spectrum band currently used by DTT for alternative uses, subject to considerations of existing co-users of the spectrum. Different spectrum users are discussed in Section 7.

4.56 A process to incentivise and support people to take up broadband and develop digital skills could reduce the number of households reliant on DTT, although there are likely to be a small number of homes that would require significant and potentially ongoing support were their DTT service to be withdrawn. We discuss the wider benefits and challenges of such a digital inclusion scheme in Section 7.

4.57 A DTT switch-off without a highly successful support scheme would risk leaving some audiences completely without access to TV services.[60] The viability of replacing DTT delivery with IP will also depend on the coverage and resilience of IP networks, and their ability to deliver universal TV to all UK homes, which we explore in Section 5.

[60] In the absence of any further incentives to promote digital inclusion, there may be 2.0m UK homes using an unconnected DTT set as their primary service by 2030 according to 3 Reasons.

The future of satellite, and Freesat's dependence on commercial satellite, will affect the outcomes for audiences in these approaches

4.58 Broadcasters are also considering how far they can continue to support the funding of satellite TV distribution to the home, despite its very wide coverage. This includes both distribution of Sky's pay platform and Freesat.

4.59 The current fleet of satellites used by Sky and Freesat is likely to reach the end of its life by the end of this decade, and Sky is shifting its strategy to deliver TV content over IP rather than satellite.[61] These developments will create a series of investment decisions for stakeholders in the satellite distribution infrastructure, including whether to invest in a new satellite fleet and whether the investment required to remain on Freesat if Sky were to exit satellite is feasible. The BBC stated in its evidence that it expects to begin discussions about future capacity with SES[62] in 2025.

4.60 As with DTT, as the number of satellite homes declines over the next decade, the cost per household for broadcasters to deliver via satellite increases. The BBC's evidence suggests that, even without inflation, the cost per DSat viewer hour in 2030 will be around five times higher than it is expected to be in the financial year 2023/24. These cost outcomes will continue to reduce the incentives for broadcasters to remain on the platform.

4.61 The BBC raised the option of using satellite as a 'nightlight' service during any transition from broadcast to IP distribution, while ensuring universal coverage for those unable to get a working IP connection. However, if satellite services would not be available from a point in the future, relying on this infrastructure to support the transition of those most dependent on DTT may not be sustainable. It could represent two transitions for some – from DTT to satellite to IP – which is both complex and raises timing issues. Further work would need to be undertaken to understand the timing and long-term vision of each infrastructure to assess the role either DTT or DSAT can play in any digital transition of the other's audiences.

Certainty over these approaches and a long-term vision for free-TV distribution is needed in the next two years

4.62 There was agreement among respondents to our Call for Evidence that a long-term vision of the future role of DTT and satellite would be beneficial for audiences, broadcasters and infrastructure providers.

4.63 Without a clear vision and a coordinated approach, cumulative decisions by audiences, channels, platforms and multiplex operators could leave the DTT and satellite platforms under-supported or unsustainable. An 'unmanaged transition' to this state over the next

[61] On 30th January 2024, it was reported that Sky had announced job cuts to its engineering teams as more customers selected digital-only services; the announcement confirmed a switch in its strategy away from satellite: "The launch of Sky Glass and Sky Stream represents a shift in our business to deliver TV over IP (an internet connection) rather than satellite". Sky to cut 1,000 jobs as customers move from pay-TV to internet, Guardian.

[62] SES is a satellite telecommunications network provider.

decade would result in a poor outcome for the audiences who depend on it today – with lower choice of high-quality channels, potentially the loss of HD services, and increasingly key content providers releasing content first or solely on IP platforms.

4.64 To deliver a managed and orderly move to any of the approaches set out above, Government and the industry will need to reach consensus on a model and give certainty to investors. In doing so, the different approaches for the future of TV distribution should be assessed for the benefits they deliver, their long-term costs, the impact on audiences and on universal provision of TV. We discuss other factors relevant to these considerations in Sections 7 and 8.

Summary of stakeholder responses

- Some stakeholders, including groups representing viewers and older audiences, argued that DTT remained an important resilient platform for ensuring universal access to public service broadcasting (Arqiva, Broadcast 2040+, Rural Services Network, Silver Voices). These same stakeholders also argued that it was highly unlikely that broadband could deliver universal access to TV over the next 10-15 years, and there will be a continuing need to safeguard DTT for the decades ahead, particularly for vulnerable groups in society.
- Many respondents argued that the recent proliferation of TV platforms is increasing financial pressures on broadcasters and those that fund the running costs of these distribution networks. As a result, it will not be sustainable commercially or good value for money to support multiple platform delivery indefinitely (Future TV Taskforce, BBC, Mobile UK).
- Some stakeholders argued that declining viewership on broadcast platforms over the next 10-15 year will create a tipping point at which the cost of distributing via DTT and satellite will exceed the benefits generated from being on those platforms (Future TV Taskforce, News UK, S4C).
- Many stakeholders also argued that increasing support for IP platform distribution is a strategic priority, allowing them to deliver a more personalised and functional viewing experience to audiences (Future TV Taskforce, Tech UK).
- Some stakeholders identified a number of options for how TV distribution should evolve into the 2030s and beyond, including maintaining or upgrading the DTT platform, reducing the number of DTT multiplexes or reducing the network's coverage, or planning for a total switch-off of DTT and the repurposing of spectrum to mobile or other use.
- Some of those advocating for a transition from DTT to all IP identified this as an opportunity to increase digital inclusion, bringing wider benefits to society beyond television (BT, BBC).
- In considering options, all respondents agreed that further work would be required to consider the costs, benefits, value for money and wider public policy implications of any proposed changes.
- Some respondents argued that it would be beneficial to provide certainty over the long-term future as soon as possible (Arqiva, Broadcast 2040+, BT, Voice of the Listener & Viewer). Others argued that it is still too early to commit to DTT

beyond 2034 (when most national DTT multiplex licences expire) or to decide a timetable for an IP transition assuming that is appropriate and desirable in due course (Future TV Taskforce, BBC).

- There was consensus from all respondents around the need for platforms, broadcasters, Ofcom and Government to work constructively to understand the choices that need to be made, including whether interventions may be required to support the DTT and satellite platforms post-2034.

5. Broadband and internet networks

5.1 Our CfE asked how broadband networks and supporting infrastructure need to evolve to support resilient delivery of TV over the internet in the future. The rise in on demand viewing and linear viewing online will drive a significant rise in data consumption over the next decade. The current organic migration of audiences to IP will put greater demands on networks even if the approaches of DTT and other major platforms remain unchanged. This would be more pronounced if DTT provision was slimmed down, or in a full switch-off, both in terms of volumes and rate of change.

5.2 This section focusses on consumer access to the network, and how broadband and internet networks may need to expand, invest and prepare to meet future audience and consumer demand.

Commercial investment, supported by Government funding, will continue to improve broadband coverage

5.3 To deliver equivalent levels of universal coverage to audiences, the broadband network would need to match the level of DTT coverage today. This stands at 98.5% of UK households for the PSB multiplexes. In addition, Freesat Coverage is 98%[63], but overlaps with DTT such that many of the remaining homes who cannot receive DTT are able to receive Freesat. This is particularly important for audiences in rural Wales. Coverage gaps are caused by different factors, with DTT coverage mainly being limited by the range of its transmitters, while satellite reception is limited by landscape affecting its line-of-sight of the satellite.[64]

5.4 Fixed broadband networks today provide coverage at decent connection speeds to an equivalent number of households. However, fewer, particularly in the nations, can receive a superfast or better connection speeds (see table 2 below).

Table 2: Broadband coverage at Fixed locations across the UK and Nations, 2023

	UK	England	Northern Ireland	Scotland	Wales
Decent Broadband (10 Mbit/s)	99.8%	99.9%	99.7%	99.4%	99.5%
Superfast Broadband (30 Mbit/s)	97%	98%	98%	95%	96%
Gigabit capable (1 Gbit/s)	78%	78%	92%	72%	64%

Source: Connected Nations 2023, Ofcom analysis of operator data (September 2023)65.

[63] Based on the availability of a line-of-sight path to the satellite. Does not include the impact of other factors.
[64] In practice, satellite reception is also further limited by equipment access limitations, for example access in multi-dwelling units where it is not feasible to install a dedicated household satellite dish and where there is no internal wired distribution system for satellite, or the need for planning permission in some locations.

5.5 The broadband Universal Service Obligation provides every household and business in the UK with the right to request a 'decent' affordable connection. A decent connection is defined by legislation as achieving a download speed of at least 10 Mbit/s and an upload speed of at least 1 Mbit/s. Taking account of coverage from both fixed line and fixed wireless networks, this connection speed can currently be achieved by 99.8% of premises, which leaves around 61,000 premises (0.2%) without such access.

5.6 A decent connection speed can be sufficient for both SD and a single stream of HD viewing, but in practice multiple users in a household can quickly put this under strain. Based on current increasing data consumption patterns, it is unlikely USO speeds would remain sufficient for a reliable IPTV viewing experience in a multiple-user household over the time frame under consideration in this advice. This was also the general consensus among stakeholders in response to our CfE, with some explicitly noting that Superfast broadband speed (30 Mbit/s) were more likely to provide a reliable viewing experience. The Government is currently reviewing the broadband USO[66], and the associated consultation document notes a 10 Mbps connection is unlikely to be able to continue to keep up with the demand of a modern household.

5.7 Superfast speeds can currently be achieved by 97% of all UK residential premises, leaving around 823,000 residences unable to achieve this speed. The remaining premises without superfast coverage are often more difficult to connect or upgrade, as discussed in further detail in our latest Connected Nations report.[67]

5.8 Our report also found that there are significant regional variations, with rural areas in particular much less likely to have access to superfast broadband. These variations would need to be considered in assessing the readiness and support needed for any changes to the distribution of TV.

Table 3: Residential superfast coverage by nation, 2023

	Total	Urban	Rural
England	98%	99%	89%
Northern Ireland	98%	99%+	93%
Scotland	95%	99%	79%
Wales	96%	99%	86%
UK	**97%**	**99%**	**88%**

Source: Connected Nations 2023, Ofcom analysis of operator data (September 2023).

5.9 Based on current network development plans Ofcom estimates that, if all network deployments are realised as planned, Gigabit capable coverage of residential premises could

[65] Our Connected Nations report provides insight on progress in the availability of broadband and mobile services in the UK, including the roll-out of fixed full-fibre and mobile 5G networks.
[66] Digital Connectivity: Consultation on reviewing the broadband Universal Service Obligation, Department for Science, Innovation & Technology.
[67] Connected Nations 2023, p15.

reach in excess of 94% by 2026.[68] There are a range of schemes to invest in broadband availability from both UK Government and the devolved Governments in each of the nations. The largest, Project Gigabit, aims to provide Gigabit capable broadband to 99% of all UK premises by 2030, suggesting there may be lesser infrastructure access concerns by then, if this timeline is met.

5.10 Many respondents suggested that greater coverage of superfast or better broadband, equivalent to current availability of DTT and Freesat, should be identified by Government as a necessary condition to any changes to DTT, especially for scenarios which reduce or move to close the service. The success of Project Gigabit, R100 in Scotland, Project Stratum in Northern Ireland, and Superfast Cymru will also be key.

Other technologies can deliver connectivity, but face greater capacity limitations

5.11 Beyond fixed broadband, other network technologies are available to provide connectivity. Fixed wireless access (FWA) and satellite fixed broadband connections can both provide superfast speeds and, under certain conditions, may even be gigabit capable. However, their performance will depend on the specific deployment, available capacity at the site, and the number and location of users.

5.12 FWA services from the Mobile Network Operators (MNOs) are provided primarily over 5G networks and advanced 4G networks. Ofcom estimates that, based on provider data, 95% of all UK premises may have access to decent, or better, broadband through an MNO FWA service.[69] FWA is however more sensitive to capacity constraints and congestion, as the provision of the service is contended with the provision of mobile connectivity. These factors mean that the suitability of FWA as a technology for serving a whole neighbourhood, or providing a connection at peak times is contingent upon the availability of adequate mobile capacity to meet the demand for both services and might be affected when targeting an entire neighbourhood or providing a connection at peak time. This was similarly noted in a number of responses to our CfE where, for example, BT noted the mobile network would be unlikely to support the vast majority of viewers' usage (with some exceptions on edge cases)[70], while Vodafone noted a number of requirements that need to be met to improve access capacity for mobile services.[71]

5.13 The extent of capacity issues on both FWA and satellite broadband, which may limit their value as an alternative access path to IPTV, is difficult to forecast over the time frame under consideration here. For example, while satellite technologies continue to improve rapidly (including from new 'low earth orbit' providers), capacity largely depends on deployment of new satellites, making suitability for delivering IPTV 10-15 years from now difficult to predict. We will continue to monitor the evolution of FWA and satellite services, including their capacity to deliver TV services to large numbers of users.

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[68] Note that not all planned network development may be achieved. Actual network deployment in 2023, as well as the revised plans for future growth, are lower than plans as of 2022.
[69] Ofcom analysis of MNO operator data 2023. For further details on methodology see Ofcom Connected Nations 2023 – Methodology Annex, ss.A1.41-A1.45
[70] BT response to CfE, p.9.
[71] Vodafone response to CfE, p.3.

5.14 Overall, FWA and satellite broadband can deliver speeds that are suitable for accessing IPTV, but their capacity limitations mean that, as the technology stands, they may not be a suitable replacement for DTT in the future, except for a relatively small number of edge cases with no alternative access paths.

We expect the gap between DTT and broadband availability to narrow over the next 10 years

5.15 As noted above, the current coverage of the core PSB channels over DTT is 98.5%. This coverage level was maintained following analogue switch-off and policymakers will need to decide if this level of coverage will continue to be required in any further switchover.

5.16 When considering the overlapping coverage between DTT and broadband, there are essentially four groups of households:

a) Those who are currently covered by DTT and Superfast broadband;
b) Those who are not covered by DTT but do have coverage for Superfast broadband;
c) Those who are currently covered by DTT but do not have coverage for Superfast broadband; and
d) Those who have coverage for neither DTT nor Superfast broadband.

5.17 The main focus of any policy consideration of changes to DTT is on groups C and D – those who have DTT today but may lose out, and those who are excluded already but may be better served in the future. Stakeholders from across the broadband and TV industry emphasised the critical importance to policymakers of those who would potentially lose access to an existing DTT service, without having an alternative IPTV access path available. Even if no changes are made to DTT provision, both groups currently lack access to the wider services offered by IPTV, which could become more problematic as services start to diverge.

5.18 As discussed above, we expect these groups to reduce in size in light of Project Gigabit, as well as a variety of initiatives in the devolved nations to provide connectivity in hard-to-reach areas. A number of these focus on using alternative technologies, with some trials and funding focussing on LEO satellite broadband provision[72] and hybrid satellite and FWA networks in rural areas.[73] A fund announced in April 2023, for example, aims to provide an initial wave of capital grants for new LEO satellite connectivity to the most remote 35,000 premises where it is known that suppliers will be unable to provide either gigabit capable or terrestrial fixed wireless connectivity.[74]

5.19 Freesat, due to its high coverage levels, provides an important alternative to those homes outside of the DTT footprint today, including many in group D above. As discussed in Section 4, the future of Freesat will affect the options for those without broadband in group C and D.

[72] Very Hard to Reach premises: alpha trials, New Investment boosts UK's digital connectivity, Department for Science, Innovation & Technology.
[73] Government launches new drive to support rural communities, UK Government.
[74] Statement: Digital Infrastructure update, Department for Science, Innovation & Technology.

Take-up levels are a bigger barrier than network availability to universal TV delivery over broadband

5.20 Though broadband availability has steadily improved over the last few years, take-up of faster connections has been lagging significantly behind availability.

5.21 Were IPTV to be relied on more as a primary means of delivering TV, the take-up gaps would need to be a significant focus. There are two main groups to consider:

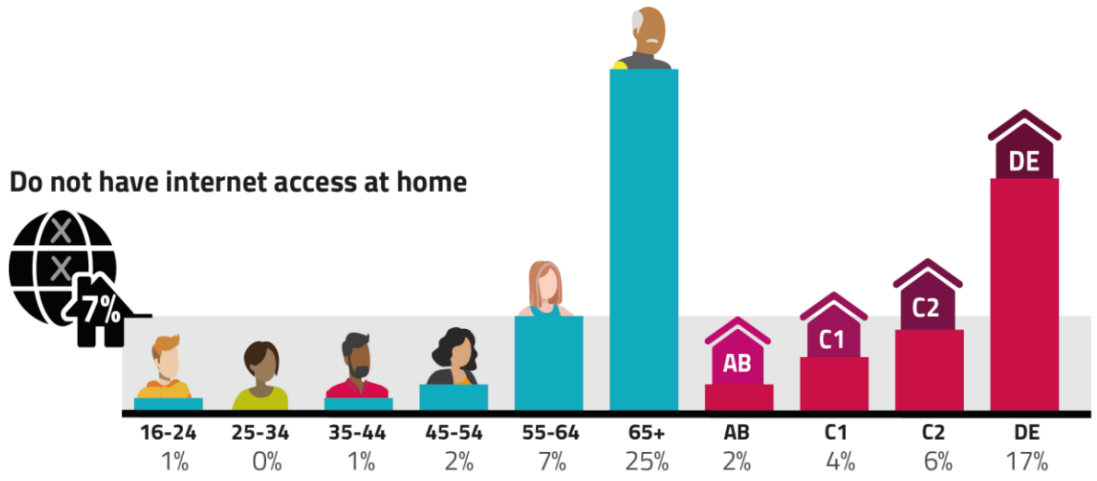
1) Around 7% (approx. 1.9 million) of UK Households which today do not have Internet access in the home at all.[75]

2) A further 4% (approx. 1.1 million) who today are solely reliant on a mobile connection rather than broadband over a fixed line.[76]

5.22 These groups create a 'take-up gap' between the availability and adoption of high speed and high-capacity networks capable of supporting whole neighbourhoods of TV viewing. The reasons for this gap are generally not related to availability of connections, and as such this is a separate challenge for policymakers to solve.

5.23 The main reasons consumers cite for not taking up connectivity is a lack of interest in going online (69%), followed by affordability challenges (20%) and concerns about complexity (20%).[77] Those in the "unconnected" group are more likely to be over-65 and in a lower-socioeconomic household.

Figure 9: Demographics of those who do not have internet access at home, 2023



Source: Ofcom Adults' Media Literacy Tracker surveys 2023

[75] Ofcom Adults' Media Literacy Tracker surveys, detailed in Ofcom Adults' Media Use and Attitudes report 2023, p.25. The 7% of homes with no internet correlates with the Barb Establishment Survey's figure for no broadband (fixed or mobile) in the home, Q3 2023.

[76] Ofcom Technology Tracker 2023, Ofcom. Qe7 "Which of these methods does your household use to connect to the Internet at home?".

[77] Ofcom Adults' Media Literacy Tracker surveys 2023. For more detail see: Ofcom Adult's Media Use and Attitudes report 2023, pp.25-26.

5.24 These consumers are relatively evenly spread over the nations, with the exception being Northern Ireland, where there is a slightly higher percentage of households without access.[78]

5.25 As highlighted by a number of stakeholders, the more attractive IPTV propositions get, the stronger the pull of IPTV in terms of taking up a broadband connection, which may have wider societal and economic benefits such as for remote healthcare, education and access to shops and services that may no longer be available physically in a local area. We discuss these wider benefits in Section 7.

5.26 There will be many households which, even if more TV services were to start to move online, would face barriers that make them unwilling or unable to adopt broadband without support. These barriers include:

- Digital literacy and skills. Our research suggests that 20% of offline households have concerns about complexity.[79]
- Mental or physical health conditions, for example anxiety about having an internet service;
- Affordability of broadband services or new equipment, which we discuss below from 5.28;
- Availability of sufficient quality connections, as discussed above; and,
- A simple preference not to have the internet in their homes.

5.27 Consumers facing one or more of these barriers would likely need a range of support to adopt broadband. The challenges posed by different barriers are quite different – for example closing a skills gap requires a different type of support to an affordability problem.

5.28 Building on our Media Literacy and digital inclusion work, we will work with consumer groups and industry to further deepen our understanding of the barriers to broadband take-up, and the sizes of different audience groups facing each barrier. This work might include further research to understand the diverse reasons consumers have for not wanting to have the internet, international studies of countries who have pursued large scale digital inclusion programmes, and an exploration of options to support different consumers getting full or minimal access to essential online services.

Households would face higher costs for access to TV if they had to adopt or upgrade their broadband

5.29 Those who already have broadband but currently do not use it, or only occasionally use it to watch IPTV content, will generally not experience a cost increase when moving their viewing to IPTV. However, costs might arise for this group if they need, or choose, to upgrade their connection speed specifically to improve their IPTV viewing experience.

5.30 Conversely, for those who would consider taking up a connection for the first time if it was the only way to access TV content, the additional costs could be relatively high. Monthly broadband costs would raise the cost of a service that is perceived as being received for

[78] Barb Establishment Survey Q3 2023. No broadband homes are measured at 6% in England on average, 7% in Scotland and Wales, and 9% in Northern Ireland.
[79] Ofcom Adults' Media Literacy Tracker surveys 2023. For more detail see: Ofcom Adult's Media Use and Attitudes report 2023, p.25.

'free' (bar the TV licence fee) to a service that may cost hundreds of pounds per year,[80] if fully borne by the consumer. There are however wider household benefits to taking up an internet connection that could offset some of these costs.

5.31 When focussing on DTT and Freesat user households, Barb Establishment Survey data suggests that around 80% (around 1.5m) of those that do not have broadband, do have Freesat or DTT in the home,[81] and would thus be faced with higher costs to continue to watch TV if forced to switch to IPTV, absent any subsidised access to enable a switchover.

5.32 Ofcom's Communications Affordability Tracker suggests 30% of households are struggling with affordability of communication services, with 10% of households struggling with affordability of fixed broadband in particular. Social tariffs, which are aimed at tackling some of these affordability challenges and mostly offer speeds over 30 Mbit/s, have increased in awareness and adoption in recent years. Despite this, 55% of eligible households in October 2023 were unaware of social tariffs, and while take-up is improving, it remains low as a proportion of eligible households (8.3%).[82]

5.33 Beyond affordability concerns, there will be some homes which simply have no wider use or wish for other internet services and a different solution for these homes may need to be considered.

5.34 Were the Government to consider scenarios for DTT that significantly reduced or switched off its services, the approach for these audiences is an important challenge to consider – and part of a wider inclusion policy. Beyond take-up barriers (which we plan further work on, see 5.26 above), areas to explore are how a scheme to help connect these consumers might be made as simple and unintimidating as possible, and whether there is a segment of society for which the initial or ongoing costs of a minimal broadband service should be met, to keep them connected to TV and public services.

Continuous growth of IPTV may cause a significant increase in data traffic

5.35 Data usage over fixed broadband has continued to grow, with average monthly traffic rising to around 535 GB per connection, which is an increase of around 11% on last year. This exceeds the average yearly increase of around 6% since 2020 but is less than increases in the years prior.[83] The predicted continuation of the trend to watch more content over the internet will likely increase data consumption further, though overall trends in traffic growth rate appear to be declining.

5.36 In Section 3, we set out viewing trend forecasts that shows a decline in DTT viewing, combined with a significant increase in IP and hybrid viewing over the next 10-15 years. While the different approaches to the future of DTT and Freesat will influence the extent of the related IPTV data consumption increase, a significant increase in this type of data

[80] Other barriers may also play a role here, such as the need for a fixed term contract commitment, credit checks, etc.
[81] Barb Establishment survey Q3 2023.
[82] Pricing trends for communications services in the UK, Ofcom.
[83] Ofcom analysis of operator data.

consumption will happen regardless of the future model for DTT. Broadband networks should prepare and invest on that basis.

5.37 In response to our CfE, a number of ISPs provided forecasts for their future peak traffic levels. Whilst these were not directly comparable due to differing or unspecified timeframes, they seemed to have an average forecast that aligned with about 20% annual growth in traffic, though the high and low estimates varied significantly here. A 20% growth would imply a more than tripling of traffic across the network by 2030, with BT estimating a high-case scenario of a 430% increase in their traffic by then.[84]

5.38 The challenge in terms of data traffic however, goes beyond average data consumption levels. One of the particular challenges posed by IPTV are the traffic peaks caused by live viewing at an already busy period. Live content cannot be compressed as effectively as on demand content and a peak IP live viewing event of 15 million households would more than double the traffic on backhaul links for CDN-based delivery vs normal usage patterns,[85] though some technologies such as multicast would lower this impact.

5.39 Certain peaks in viewing, such as (inter)national events can be predicted and planned for. Evidence gathered in the context of our Net Neutrality Review shows that exceptional traffic peaks have arisen as a result of a single event or of multiple events occurring simultaneously and that these have largely been driven by the livestreaming of popular sports, especially football.

5.40 Some peaks are however more difficult to predict and plan for, especially when caused by different service sectors. Traffic peaks are not solely caused by live event TV viewing, with in particular releases of video games causing traffic peaks, although to a lesser extent.[86] A confluence of these events can be most difficult to predict and manage, though greater coordination between service providers and internet infrastructure companies could help considerably, for example to coordinate the timing of live TV events and large file releases from the gaming sector.

5.41 How such traffic peaks are dealt with therefore largely depends on how delivery methods and technology develop over the next decade and coordination between market players. Multicast and Deep CDN-assisted unicast[87] are both technologies that offer promising alternatives which would reduce network traffic levels significantly and reduce delivery costs. For example, BT Group's MAUD (multicast-assisted unicast delivery) claims it is up to ten times more efficient in delivering live content than unicast.

5.42 There are however currently still significant limitations to multicast technology in relation to IPTV traffic delivery. Pausing and rewinding live TV streams forces a multicast stream to become unicast, while serving different adverts to each user is not yet possible, which limits its functionality. Overall stakeholders held different views on whether Multicast or Deep CDN-assisted unicast were preferable.[88]

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[84] BT CfE response, p.2.
[85] Technologies for distributing linear content over IP, Analysys Mason.
[86] Net Neutrality Review, Ofcom, paragraph 3.45.
[87] For an explanation of these techniques, see Technologies for distributing linear content over IP, Analysys Mason, slide 5.
[88] For example, BT expressed a preference for Multicast in its response, while Mainstreaming expressed a preference for a CDN model with deeply deployed Edge services using Unicast methods.

5.43 ISPs and broadcasters, through their distribution and CDN partners, are already planning to significantly invest to meet rising demand.[89] Some ISPs have however expressed concern whether all parties in the IPTV delivery chain have sufficient incentives to deliver traffic as efficiently as possible, as well as concerns around their own ability to meet the cost of the required network expansion.[90] These concerns have been discussed in more detail in our Net Neutrality review.[91] Our updated guidance on traffic management should allow ISPs to deal with these unexpected peaks more effectively by prioritising certain types of traffic.

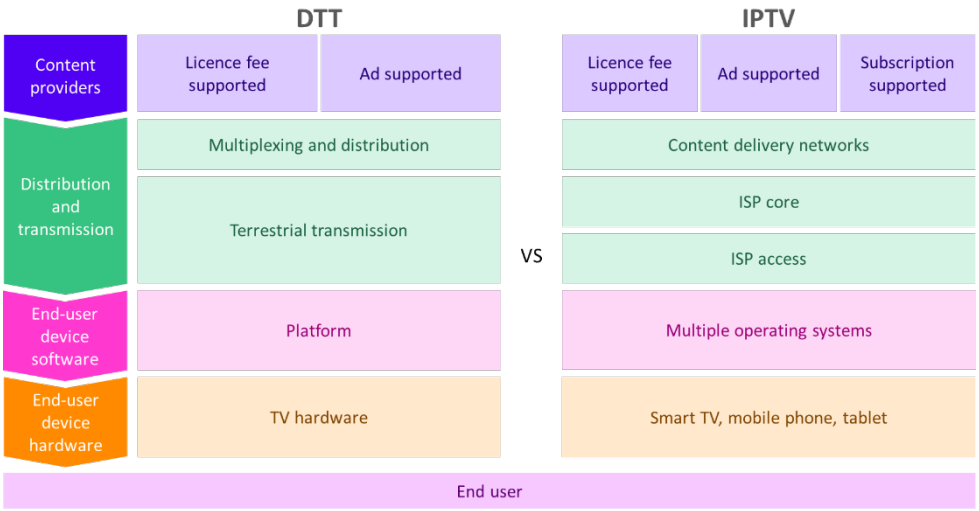
5.44 Historically, ISPs have kept up investment so that higher demand is met with higher capacity. While there are uncertainties around the scale of future investment required as network demands grow, the traffic management techniques allowed by our net neutrality guidance and the developments in delivery technologies may help manage the investment required to address this growth.

5.45 What we can be confident of is that over the next decade delivery technologies will keep improving with further innovation, increasing the efficiency of delivery networks. We heard from stakeholders different views on which technologies are preferable, though a common ambition is to find options that maximise cost and energy efficiency, as well as maintain resilience of the networks.

Coordination will be needed between different stakeholders to cope with the increasing data demands of IPTV

5.46 Compared to DTT, the IPTV delivery value chain is more complex and involves a larger number of stakeholders.

Figure 10: DTT and IPTV value chains



[89] Ofcom, Net Neutrality Review (26 October 2023) ss.3.46-3.57 and more detailed discussion in s.11 of the same document.
[90] See for example the CfE responses from Vodafone and BT. Sky, however, offered a contrasting view in its CfE response noting there is no reason to believe that such investments pose an insurmountable challenge to network providers.
[91] See Chapter 4 and 11 of the Net Neutrality review for more detail.

5.47 Firms across the content delivery value chain will need to coordinate to ensure networks can cope with the increasing data demands of IPTV. In particular, advanced notice and cross-sectoral planning is often required to manage large traffic peaks. In addition:

- Content providers will continue to need to invest in content delivery technologies such as CDNs. This can be done through the development and use of their own CDNs, or paying for the use of third party CDNs. It is currently a common strategy for content providers to use multiple CDNs to ensure resilient delivery.
- CDNs have relationships with ISPs and content providers, which makes them a critical part of current and future content delivery.
- ISPs need to invest in network capacity.

5.48 In addition to the above, the whole delivery chain would potentially need to work together to implement multicast, or other promising delivery technologies that maximise the efficiency of delivery.

5.49 The need for coordination between different stakeholders is further explored in Section 8.

The choice of TV distribution technology has an impact on energy consumption

5.50 Climate change and increasing energy costs have risen up the agenda for stakeholders, policy makers and wider society. We heard from stakeholders in their responses to the Call for Evidence that they were concerned about energy efficiency and greenhouse gas (GHG) emissions resulting from TV distribution.

5.51 Recent studies have attempted to estimate the energy intensity of different TV distribution technologies, including DTT and streaming. Some stakeholders mentioned a recent study by Carnstone, commissioned by Ofcom. This study found viewing one hour of TV via DTT is significantly more power efficient and causing lower GHG emissions than to a streaming equivalent at current viewing volumes, in line with findings in other reports. As the portion of audiences that are IP-only grows and the DTT-only audience group shrinks, the relative energy efficiency of the technologies will change.

5.52 For both OTT and DTT services and across the UK viewing population, these studies found that most of the energy consumption is within the home rather than in the distribution system – TV sets, viewing devices, and in-home networks account for 90% of the energy used for each hour of viewing. Some devices used within the home, such as Wi-Fi networks and set-top boxes, are however usually always-on and consuming power (albeit typically at low levels) regardless of whether TV is being viewed.

5.53 These studies provide us with a snapshot of the energy intensity of different infrastructures today, and do not forecast future energy efficiency. Outside of the home, energy use in network transmission drives some differences between DTT and OTT. Network transmission uses six times as much energy for OTT based on today's volume of viewing (noting that for both technologies it is not a very large driver of overall energy use).

5.54 Given viewing trends, absent a change in direction we expect to see increased IP usage (and associated energy consumption) without any change to the energy usage of DTT

transmission. The more efficient DVB-T2 transmission standard would reduce energy costs for DTT and emissions by around 60%.[92]

5.55 Running two networks simultaneously capable of delivering universal TV services is inherently inefficient. We talk about energy efficiency as a factor for considering the merits and costs of different approaches to the future of DTT in Section 8.

IPTV poses different resilience challenges from DTT

5.56 Ofcom currently sets standards of reliability (measured in terms of service availability to viewers) for the PSB multiplexes in its Television Technical Performance Code.[93] These require reliability to be maintained to levels that are as high as reasonably practicable. The minimum standard of availability is 99.8% for viewers served by reference transmitters and 99.0% for other transmitters.[94] Most transmitters exceed this reliability.

5.57 There are currently no equivalent standards set for the reliability of services delivered over IPTV.[95] A general observation is that due to the more complex nature of the IPTV delivery chain, failure can occur at many points – from congestion at a peak time at the CDN to a WiFi problem in the home. There is a risk that where failure occurs, viewers will be unable to identify which part of the distribution system has failed and, consequently, who to contact to report or remedy the issue.

5.58 Different groups of stakeholders flagged in their response to the CfE a number of resilience challenges when it comes to IPTV delivery. Resilience concerns focussed on three areas: power supply challenges, 'traffic delivery' resilience and risks associated with a single-point-of-failure. As the previous section considered the challenges of dealing with traffic delivery resilience, the below will focus on the other two concerns.

5.59 The most common causes of outages that interfere with DTT services are a result of either a failure of incoming electricity supply to the transmitter or interference caused by unusual atmospheric conditions. To address power issues, all larger transmitter sites are backed up by power generators. Additionally, transmitters serving the largest number of households typically have completely duplicated signal paths, so that any single signal failure will not stop the service.

5.60 As discussed in Section 4, while running multiple access paths for content provides viewers with both choice and resilience, the cost of doing so can be high and may prevent investments being made in other areas that would benefit consumers. On the other hand, there are benefits of DTT and radio services being available for resilience of public service communications in power cuts or emergencies, which we discuss in Section 7.

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[92] DVB-T multiplex carries 24Mb/s and a DVB-T2 multiplex carries 40Mb/s in the same amount of spectrum, using the same power.

[93] Currently Multiplex 2, Multiplex A, Multiplex B, Multiplex C, and Multiplex D.

[94] Television Technical Performance Code, Ofcom, section 4.

[95] iPlayer and similar services deliver TV content to consumers through their internet access service e.g. their home broadband service, where that content is treated equivalently to other online content. ISPs can also offer services other than internet access which optimise traffic to meet quality requirements for specific content, applications or services that cannot be met by general internet access services, commonly known as 'specialised services'. In our Net Neutrality Review statement (paragraph 10.44), we noted Linear IPTV services using multicast technology as an example of a service that might meet the optimisation criteria. Such treatment could provide this content with better quality of service guarantees.

5.61 Providing resilience, in whatever form, will come at a cost. Further work will be needed to decide on the level of resilience required for IPTV and our overall communication system and what delivery system(s) should be the focus of regulation. The required level of resilience will further inform the potential and cost of providing this within the current broadband network, or whether a secondary delivery system such as DTT or an emergency mobile delivery network may be required.

Summary of stakeholder responses

- The importance of ensuring full digital inclusion for preserving universality was noted by a number of stakeholders (Future TV Taskforce, S4C). Others observed broadband availability and reliability must match DTT levels, or be universal, before a full switchover can be considered (MG Alba, Pact, Paramount).
- Broadband availability was generally noted to be improving across the UK but there were concerns about affordability among most groups of stakeholders and about availability in rural areas (S4C, Advisory Committee Scotland, Rural Services Network, Teledwyr Annibynnol Cymru, consumer submissions) which could undermine universality. In relation to this, stakeholders observed government programmes would need to deliver their ambitions.
- Take-up of broadband was generally viewed as a bigger barrier to switch-over issue than availability (BBC, Together TV, Future TV Taskforce), but some highlighted the potential for IPTV to act as an incentive for take-up (BBC, Mobile UK), which will have wider benefits to the UK economy (Internet Services Providers' Association (ISPA), BT, S4C). Several stakeholders noted the value of a take-up scheme from Government for an eventual transition (ISPA, Nimux, Children's Media Foundation).
- A number of ISPs expressed the view that broadband networks are not currently capable of replacing broadcast networks at the scale that would be required for distributing high quality access to live content (Vodafone, BT, Mainstreaming, SES), though some broadcasters noted that a stable IP offering is already being provided on a smaller scale (Future TV Taskforce, BBC, S4C).
- Across all groups of stakeholders there were some concerns about the resilience of IPTV, mostly focussing on points of failure and the potential reliance on one technology for emergency communications. There was agreement a full switch to ITPV will significantly increase (peak) data traffic, but several stakeholders noted network investment incentives have been strong to date (BBC, Sky).
- It was noted that delivery technologies are being developed which will reduce traffic loads (BT, News UK, Netgem), but a more coordinated approach to development and implementation may be needed (Rohde & Schwarz Services Ltd, Service List Registry, BT).
- Stakeholders differed on the most energy efficient content delivery network but agree on the importance of in-home energy consumption in this equation.

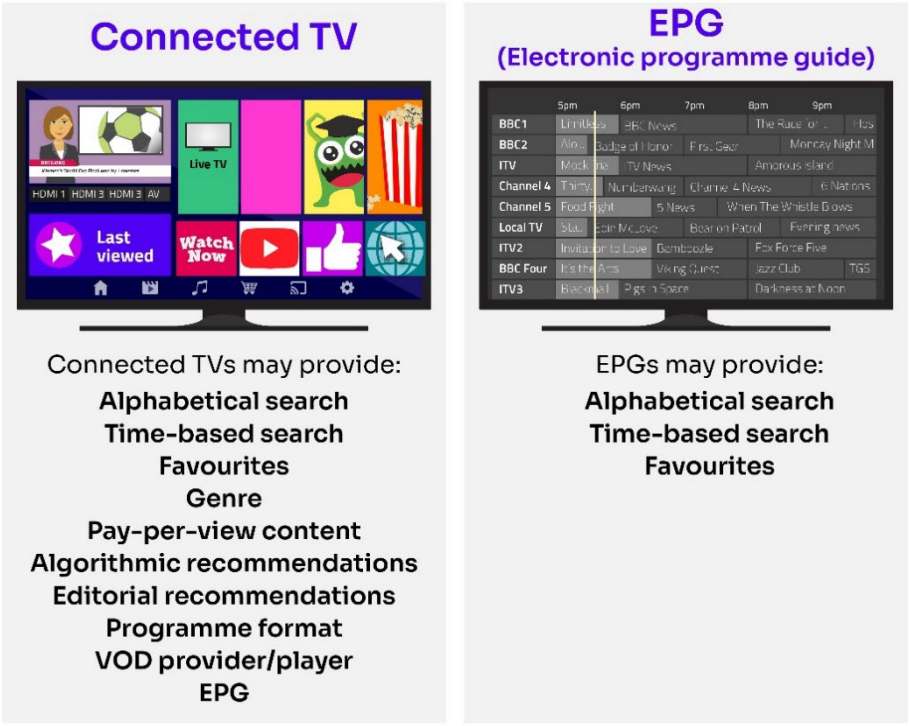
6.User interfaces, accessibility, and usability

User interfaces are increasingly important in how TV services are made accessible and easy to use for audiences

6.1 Audiences benefit from choice and innovation in TV platforms. Different platforms offer a range of options and choices in terms of user functionality, content selection, navigation, and the design of user interfaces (UI). For many years audiences have been able to choose between DTT, Satellite, and Cable TV, and from range of connected or IPTV-only platforms, and often use a combination of these.

6.2 For over two decades, DTT receivers have been built-in to most TV sets sold in the UK. The main DTT platform, Freeview, has provided audiences with free-to-view, consistent and easy-to-use channel guides. TV broadcasters, platforms and TV set manufacturers have developed and collaborated on DTT's design and accessibility, and shared technical standards and best practice, through industry bodies such as the Digital Video Broadcasting project and the Digital Television Group (DTG). Although there are differences in the UIs between TV sets with DTT, audiences have come to rely on a familiar set of functionalities across them, based around accessible Electronic Programme Guides (EPGs) navigated by simple remote controls with channel numbers and subtitle and audio description buttons.

Figure 11: Connected TV user interfaces compared to DTT EPG



6.3 Connected 'Hybrid' or IPTV-only platforms can combine some or all of on-demand, streaming services, interactive content and broadcast content, and their UIs may be more complex compared to DTT. User experience and UI design is regarded as an increasingly important area of innovation and differentiation by platform operators.

TV platforms need to consider the usability of their interfaces for different audiences and their needs

6.4 As the range and choice of TV platforms and user interfaces increases, it is important that TV services remain accessible for all audiences. As more and more audiences adopt IPTV services, it is also important that TV platforms cater for the range of potential needs in terms of both usability and accessibility. This will enable all audiences to enjoy the full range of services available and to fully benefit from innovations in platform and UI design.

6.5 We have recently completed qualitative research on the experience of a range of disabled audience groups when attempting to access TV.[96] The Communications Consumer Panel also publishes research on inclusivity and accessibility of audio-visual and other communications services.[97] This research shows the importance of design principles which include considering the needs of audiences who may have limited digital literacy skills, particular accessibility requirements or sensory conditions in how they access and use TV services.

6.6 In 2023, we commissioned strategy and design firm Projects by IF to undertake qualitative research into TV UIs and audience interactions and their experiences in using them. We have published a summary of the research alongside this report.[98] The research suggested that there may be a variety of reasons why different audience groups can have differing needs when using TV interfaces. The research identified three key types of needs in usability and accessibility. Audiences in these groups may have additional and overlapping needs which may compound the barriers faced by them.

- **Age**: Older audiences are more likely to be afflicted by age related-impairments (such as loss of sight, hearing or dexterity) and many have lower levels of digital literacy compared to younger audiences. With an aging population, older audiences are growing in number and may also be particularly affected by changes to how they receive TV services.
- **Impairments**: Audiences with sensory, cognitive and/or physical impairments may experience a range of challenges in accessing the TV programmes and services they want to watch;
- **Literacy**: Audiences who possess lower levels of literacy or English reading skills and low digital skills may experience difficulties in accessing and interacting with word-based EPGs and UIs and find it difficult to find the content most relevant to them.

6.7 Many viewers with these characteristics use a range of TV platforms, including IPTV. However, data from the Barb Establishment Survey suggests that viewers who only use DTT to receive TV services are more likely to have one or more of these characteristics. As illustrated in Figure 6 in Section 3, viewers in households who only have access to DTT to

[96] Audience expectations of access services across TV and Video-on-Demand services, Ofcom.
[97] E.g.: Making communications services inclusive and accessible and access to broadcast and on-demand content.
[98] Report on TV interfaces and vulnerable users, Projects by IF.

watch TV are more likely to be over 75 years-of-age, from lower socio-economic backgrounds and have a disability. In Q3 2023, Barb Establishment Survey data suggests that 2.6 million DTT-only viewers in the UK met at least one of these characteristics. These audiences are likely to depend on DTT for TV services and may find other platforms less usable or accessible.

IPTV user interfaces offer both challenges and opportunities in usability and accessibility for audiences

6.8 IPTV UIs may create challenges for accessibility if they are not designed with the needs of all audiences in mind. Projects by IF's study suggested a number of examples of challenges in current IPTV platforms and how audiences use them:

- Many IPTV platforms and services require log-ins and passwords to be set up and entered, often online, before they can be used;
- IP-based interfaces have tended to be designed in a manner which is more suitable for those with higher levels of digital-literacy, with design of the user interface more like a smartphone or tablet touch-screen interface than traditional TV.
- While intuitive for audiences familiar and comfortable with smartphones, it may be unfamiliar and difficult to navigate for others;
- Recommendation 'rails' for particular on-demand services and programmes may overwhelm audiences who possess low levels of digital literacy;
- This may limit the extent to which some viewers can navigate on-screen UIs to find TV services. For example, more of the navigation will be through on-screen menus containing App 'tiles' (for example, an 'TV EPG' App, or branded 'channel' App) rather than by traditional remote controls with numbered or quick-launch buttons.

6.9 Respondents to our Call for Evidence noted similar potential risks to usability for audiences from a shift toward IPTV platforms. The Service List Registry and the Voice of the Listener & Viewer (VLV) suggested that using online services is typically more complex than the 'channel' based selection found on DTT and requires high levels of digital literacy.[99] Tech UK suggested that some audiences may experience barriers to accessing content if they are required to set up and log in to user profiles in order to access content.[100]

6.10 Several respondents to our Call for Evidence identified the opportunity for IPTV platforms to provide additional features and benefits for all audiences. Stakeholders considered that the level of personalisation afforded by IPTV UIs may help improve general user experience as it recommends content that aligns with audiences' individual preferences.[101] IPTV may allow audiences to customise the appearance and use of access services, for example in being able to adjust the text-size of subtitles.

6.11 IPTV may also offer opportunities for improved usability for all audiences through functionality that is not available through DTT. For example:

- Pause and 'start from beginning' functionality;

[99] Service List registry response to CfE p.19 and VLV response to CfE, p.20.
[100] Tech UK, response to CfE, p.4.
[101] BBC response to CfE, p.43, RNIB response to CfE, p.6 and Tech UK response to CfE, p.3.

- Access to wider ranges of content and increased viewing functionality (such on-demand and time-shifting of viewing);
- Personalised recommendations and 'saved' lists of programmes to watch across broadcast and on-demand content services.

6.12 IP-based UIs may also offer significant opportunity to increase and customise accessibility for audiences with disabilities affecting their hearing, sight and mobility. For example:

- Voice search for blind people and those with sight loss;
- A greater provision of access services, including more automated or AI assisted subtitling and audio description;
- More targeted and customised accessibility services for less common disabilities or combinations of conditions;
- Incremental improvement of service through software updates;
- Possibility to trial new features.

IPTV platforms could include, and improve on, the functionality of traditional TV platforms

6.13 Over the next few years, ownership of smart TVs and active use of Connected TV platforms is likely to increase further. As suggested by a projection by MTM/3 Reasons, that Figure 7 illustrates in Section 3, by 2035 just over 90% of households will have a TV which is connected to IP-delivered video, and households who solely use IPTV technologies will make up approximately 62%.. The growth in IPTV will bring a broader set of platforms and user interfaces for UK TV services and UK audiences.

6.14 There is an opportunity for platforms to offer some of the familiar elements and functionality of DTT, combined with the flexibility and customisation that IP delivery allows. For example, including a 'default' option for EPG-based navigation similar to that found on DTT remains important for some audiences, while they may benefit from integrated 'pause' and 'on-demand' options in this for the first time. An example of one platform seeking to provide this user experience is the new service from Everyone TV (the joint venture from the UK PSBs) called Freely[102], which offers a traditional channel guide that can be delivered by IP or through a DTT aerial while integrating IPTV features.

6.15 The research by Projects by IF also noted that audiences may benefit from being able to access TV services without the need to set up and log-in to user profiles. However, there are benefits that user profiles may have for audiences and platform and content provider business models (in content recommendations, or personalised-ads).

The Media Bill will introduce new accessibility requirements for IP delivered services

6.16 The current regulation shapes and sets some expectations for the accessibility of regulated EPGs and linear TV services.[103] Ofcom implements requirements relating to the accessibility

[102] Everyone TV reveals Freely user interface with first-time features for free TV | Everyone TV. Freely has launched 29 April 2024.
[103] We note that DCMS published a consultation on the regulation of additional EPGs.

of TV services, including provision of access services (subtitling, audio description and signing), and accessibility requirements for EPG providers.[104] We report annually[105] on compliance with these requirements. We also report annually on the accessibility of on-demand services, and are conducting research[106] and engaging with broadcasters, on-demand providers and user groups to further improve services in this area. We have recently published changes to our Access Services Code and associated best practice guidelines, to improve the accessibility of TV and on-demand programmes for audiences.

6.17 The Media Bill, once enacted, will put in place new accessibility requirements for certain IPTV platforms and on-demand services that are designated by the Secretary of State. These requirements aim to ensure that these platforms and on-demand services will be accessible for disabled people, particularly those with disabilities affecting their sight and/or hearing.

6.18 We have published a roadmap and prospective timetable for implementing the Media Bill, including new accessibility requirements. Ofcom will develop codes of practice and guidance to help platforms and on-demand services meet these new requirements.

We will work with stakeholders to facilitate sharing of principles and best practices for accessibility and usability across platforms

6.19 Over and above these specific requirements, in their responses to our Call for Evidence, stakeholders stated that collaboration between content providers and platforms would help ensure that developments in UI design have inclusivity and accessibility built in as standard.[107] Industry bodies such as the DTG, work with their members to address common issues and develop standard approaches in the technology and specifications of TV equipment.

6.20 Stakeholders identified a role for Ofcom to facilitate wider discussions between industry groups and audience and consumer representatives. They noted this will improve the audio-visual experience for all audience groups. No matter how distribution and viewer choices evolve, widely usable and accessible interfaces will be needed to be inclusive of all audiences.

6.21 To address these issues, we plan to facilitate a new working group comprised of audience groups, consumer representatives, TV set manufacturers and TV platforms. This will aim to share and develop best practice in maximising inclusion for audiences across their user journey.

Summary of stakeholder responses

- Many respondents to our Call for Evidence agreed that IPTV services could deliver significant benefits to audiences including additional content choices and functionality such as new ways to discover and manage content.

[104] Code on television access services and code on electronic programme guides, Ofcom.
[105] EPG accessibility report 2023, Ofcom.
[106] Usability and accessibility research, Ofcom.
[107] Tech UK response to CfE, p.4; Future TV Taskforce response to CfE, p.16.

- Some stakeholders highlighted the additional benefits that certain IPTV features could have for those with disabilities, including next generation subtitling, audio description and better personalisation (RNIB, BBC).
- S4C and the Welsh Government also confirmed that IP has the potential for enabling better access to non-English language content on TV, including subtitling in multiple languages.
- Some respondents also identified the risk that some viewers may find IPTV user interfaces unfamiliar, complicated and confusing (BBC, BT, Future TV Taskforce).
- There was agreement among all respondents that audiences without the skills or experience of using connected technology would need an appropriate level of support in the future.
- Some respondents argued that there should be greater move towards standardised hardware and software (Voice of the Listener & Viewer), but others felt that the emergence of multiple user interfaces is a sign of greater innovation and consumer choice (News UK).
- Some of the evidence we received highlighted that the user experience was increasingly designed and operated by global platforms who run the underlying operating systems of many devices, and that this created risks to the findability of UK and PSB content (BBC, Future TV Taskforce, S4C, Together TV, PACT).

7. Interaction with other sectors and policy areas

Decisions on the future of TV distribution should consider the effects on other sectors

7.1 Future decisions by industry, Government, and Ofcom, on the future of TV distribution will have consequences for other sectors. These effects are more than secondary impacts to be assessed and quantified – they are key factors in weighing up the merits of different options for the best model for TV distribution. This section discusses several of these factors:

- The benefits for the economy, society and public services that would result from near-universal broadband take-up;
- The efficient use of spectrum and demand from alternative spectrum users;
- The continued provision of spectrum for wireless microphones and other Programme Making and Special Events (PMSE) applications;
- The sustainability of analogue and DAB radio broadcasting services;
- The ability for Government to make emergency broadcasts in the event of widespread power or telecommunications outages; and
- The implications of rising distribution costs for the creative economy.

Wider benefits of broadband adoption and digital inclusion

7.2 As we discuss in Section 5, take-up of broadband is a major barrier to relying on it to be the primary or sole means of distributing TV services. For TV distributed over the internet to provide appropriate levels of universal delivery, millions more people would need to adopt broadband services. This includes those who have no connectivity at all but watch TV on broadcast platforms and those who have a basic connection which may be unsuited to supporting a full TV service (especially at peak times).

7.3 Over the coming years, some consumers will be drawn to get a broadband subscription for a range of reasons, including higher definition or on-demand TV, or keeping in touch with friends and family. Other factors such as consumers requiring access to shopping and services which may be less likely to be available nearby, especially in rural areas, could contribute to an increase in broadband take-up.

7.4 However, some homes are likely to remain disconnected. Estimates will vary given the range of factors influencing it and whether specific policy interventions happen in the future. There are currently 1.9m homes not connected to the internet at all, and a further 1.1m rely solely on a mobile connection for internet access.[108] If we consider the numbers for superfast broadband (>=30Mbit/s), the take-up was 72% of the UK population, meaning

[108] Adults' Media Use and Attitudes report 2023, Ofcom.

around 8.9m homes do not take-up a superfast or faster connection today.[109] Estimations from a report from EY[110], commissioned by Arqiva, forecasts that there will still be millions of homes that do not take-up superfast broadband by 2040 (assuming there will be no policy interventions in this area).

7.5 If a move of TV to internet distribution is signalled clearly as part of a partial or full 'switchover', some of these households would be spurred into action by that decision.[111] However others would continue to face a range of barriers that they are unable or unwilling to overcome without support, from affordability to skills. We set out these factors in Section 5, and note in 5.26 our plans for further work to explore the complex barriers to broadband take-up.

7.6 Supporting all these groups would be a complex policy challenge if the Government retained the objective to deliver TV to all those who benefit from it today. But the benefits of such a programme to connect those households would be much wider than for TV distribution. Responses including the BBC, Future TV Taskforce and S4C to our Call for Evidence highlighted the wider societal context on digital exclusion. They pointed out that while future proofed TV distribution provides one case for a nationwide broadband take-up programme, there may also be wider benefits.

7.7 If a widespread broadband take-up and digital exclusion scheme is considered, there would likely be benefits for social care and the health service, for education and other public services, as well as the digital economy and environment. A previous evaluation of the effects of the Superfast Broadband Programme also showed individuals directly benefitting, with amongst other, measurable consumer benefits, a reduction in unemployment and an increase in hourly earnings. We might also expect a positive impact on productivity and the wider economy.[112] These are all factors the Government could weigh alongside the benefits and costs relating to TV distribution.

7.8 Overall, there are parallels between audiences who risk being left behind by the migration or launch of online TV services and those who are digitally excluded from a migration online of other commercial and public services. This exclusion is likely to grow over time as most people use more online alternatives to physical shops and public services. Government may wish to consider bringing together a wide range of stakeholders (public and private) to design a scheme that addresses this issue, and to maximise the benefits for people who are currently digitally excluded, and for wider society.

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[109] Connected Nations UK report 2023, Ofcom, p.16.

[110] TV distribution after 2034, EY. The model forecasting broadband take-up relies solely on demographic change to drive take-up. It does not consider other likely relevant factors such as past trends in take-up, commercial or technological developments or policy interventions.

[111] As mentioned in Section 5, the main reasons consumers cite for not taking up connectivity is a lack of interest in going online (69%), followed by affordability challenges (20%) and concerns about complexity (20%). Those in the "unconnected" group are more likely to be over-65 and in a lower-socioeconomic household.

[112] There are a number of studies finding that increased broadband adoption leads to an increase in productivity and/or economic growth, see for example, Exploring the Relationship between Broadband and Economic Growth (World Bank, 2016) and The economic impact of broadband: evidence from OECD countries (Pantelis Koutroumpis, 2018) a study commissioned by Ofcom.

Coexisting users of the radio spectrum

Demand for spectrum from the mobile telecoms sector

7.9 In our Call for Evidence, we noted that the spectrum band used by DTT today can also have other applications. Mobile phones increasingly support mobile signals that use some of the same spectrum bands as DTT, and these bands are already used by the mobile sector in other parts of the world. Additional spectrum could improve the quality of mobile phone services available today and in the future.

7.10 Responses to our Call for Evidence confirmed that there would be interest from mobile network operators in access to some or all this spectrum if it were to be made available. Mobile UK, which represents a number of the UK's mobile network operators[113], said in its response that, "the change of use of DTT would potentially free up radio spectrum that could be put to very good use for wide-area mobile services and to meet the increasing demand for IoT services in rural areas and deep indoor locations".[114] There were also suggestions for repurposing the spectrum for LTE or allocating it to low-band 5G.[115]

World Radio Conference 2023

7.11 Since we published our CFE, the World Radiocommunication Conference (WRC) concluded in Dubai. Among the agenda items was a consideration of the future uses for the relevant band (known as Ultra High Frequency spectrum, or UHF) internationally. The WRC outcome signals how the band will be used over the next 8 years and sets a timetable for a further review of the band in 2031. In the meantime, the UK retains the ability to decide how the UHF band is used domestically and the international decisions that were taken at WRC-23 inform rather than constrain the UK decisions on the future of DTT.

7.12 The outcome of the WRC across the European block of countries was to agree on a Secondary Allocation for mobile broadband services across the whole of the UHF band (470-694MHz) which is currently used for DTT broadcasting. This means that countries can choose, if they wish, to allocate this spectrum to mobile broadband uses rather than terrestrial TV signals. In addition, some North African countries agreed a Primary Allocation of the band for mobile services at the top end of the band – 614-694MHz. Support in mobile handsets for UHF spectrum is strongest in the 614-694MHz band because that part of the band is already used by mobile in some countries. As mentioned above, the allocations for UHF spectrum are planned to be on the agenda for review at the 2031 WRC.

7.13 Ofcom welcomes the outcome of the WRC, which provides a good outcome for the UK and retains discretion for the UK over how the relevant spectrum band will be used well into the 2030s and possibly beyond. The decision sends a clear signal to manufacturers that DTT will be a key feature set for televisions for at least this time period.

[113] Mobile UK represents BT/EE, Three, Virgin Media O2, and Vodafone.
[114] Mobile UK response to CfE, p.8.
[115] See for example CfE responses provided by Maxxwave and National Broadband Ltd.

Potential for greater compression – investing in more efficient broadcast standards

7.14 Given the WRC outcome noted above, we are mindful that there is growing demand at the top of the band in consumer mobile devices, and now a focus in some countries on making the upper end of the spectrum band currently used for DTT (614-694MHz) available for this purpose. Set alongside the responses to our CfE, we note that these developments put more focus on the future demand for capacity for DTT and the potential for the DTT use of the UHF band to be delivered using more efficient technologies.

7.15 Repurposing the spectrum for non-DTT uses without compression would come at the expense of DTT services. Greater compression efficiency (through updates in modulation and coding) of DTT could instead enable it to coexist alongside other users with less spectrum. While new standards are more power and cost efficient to operate, we note that a number of stakeholders voiced concerns over the higher capital costs of investing in the broadcasting equipment. Such an upgrade would make less sense if the ambition is to completely turn off DTT within the next 10-15 years, but more if DTT is to continue in a slimmed down or full form for the longer term.

7.16 A migration to the more efficient standards for DTT (the technical standards known as DVB-T2 and MPEG-4) would involve consumer support in addition to greater network investment. 3 Reasons estimates that in 2030 there will be 0.2m DTT homes with an older TV (with DVB-T receiver) as their primary set and 0.9m homes with one as their secondary set. These would need updated equipment (such as a new 'set top box' or television), and for some, potentially support to install it. This consumer support would have cost and administrative requirements for broadcasters, Government or regulators to consider.

7.17 Given the demand at the top of the UHF band, the growing adoption of T2 capable tuners among audiences, and our ongoing duties to secure the efficient use of spectrum, we will work to assess the benefits and costs of greater compression in DTT. This work will inform the ongoing Government evaluation of the future of TV distribution. When we do this work, we will also consider the potential impact on the PMSE services that share spectrum with DTT (see below). We discuss how the merits of spectrum compression vary according to the approach taken to the long-term future of DTT in Section 8.

Programme Making and Special Events

7.18 Today, the UHF spectrum band that hosts DTT is also used for the Programme Making and Special Events (PMSE) sector. This sector uses spectrum to operate wireless microphones and other devices used in entertainment and programme production that support the UK's production sector.

7.19 Several respondents made clear that these uses of spectrum are important to the creative and entertainment economy and that long-term certainty of spectrum access is important for device manufacturers to support the right bands and the providers who invest in equipment.

7.20 We recognise PMSE users are an important stakeholder in UHF spectrum and any future changes would need to ensure that the UK can continue to safeguard the benefits that PMSE delivers.

Coexisting users of the DTT infrastructure

Radio services

7.21 While the primary focus of our work is the future of TV distribution, decisions and outcomes relating to TV platforms may have implications for the radio sector. Many audiences who rely on DTT services, and millions who don't, also regularly use FM and DAB radio services.

7.22 Analogue and DAB radio services are broadcast from around 300 of the 1,100 DTT masts. This means that for those sites, the fixed costs of the masts are currently shared between TV and radio users. These shared sites are mostly used to broadcast national analogue and digital radio, including to rural areas and on rural roads.

7.23 A report commissioned by Government on the future of radio and audio stated that it sees FM continuing until 2030 at least. The radio sector is calling for certainty to support long-term investment beyond 2030 and the Government faces choices similar to those relating to the future of TV distribution: switch off FM and support a migration to DAB, or keep FM going through the 2030s alongside DAB.

7.24 There are some differences of opinion among broadcasters about the impact of changes to the DTT platform and the financial sustainability of radio broadcasting. The BBC claimed in its evidence to us that it does "not believe that a move away from or even, ultimately, closure of DTT would prevent the continuing provision of terrestrial radio… even under current pricing models, there are options to ensure that it remains affordable for the radio industry to maintain radio services in the absence of DTT". However, commercial radio providers were concerned about the unintended consequences of changes to the DTT platform. These concerns include the potential for the common fixed costs currently shared between TV and radio to fall solely on radio broadcasters making the sector economically unviable.

7.25 While the sharing of infrastructure between TV and radio may not be sufficient reason to sustain the 300 shared masts on its own, the decisions on TV will have knock-on consequences for evaluations of the future approach to DAB, and the potential for FM switchover post-2030. Supporting DAB and/or FM such that they are able to continue sustainably to serve audiences is a benefit of maintaining a full or partial DTT service going through the 2030s.[116] Coming to a timely view on the future of DTT is therefore important to inform the strategies of radio broadcasters as well as stakeholders in TV distribution.

Resilient communications in times of emergency

7.26 As set out in the UK Government Resilience Framework, there are emergency events which can require communicating with lots of people in an area at the same time. Such events can include extreme weather, a cyber incident, or a utilities or communications fault or outage. In these moments, it is important for Local and Central Government to be able to communicate with the public in an area to share civic notices or specific instructions.

[116] Looking further ahead, the industry continues to research the role that fixed and mobile IP networks might play in radio distribution, including whether multicast has a role in distribution over 5G. This builds on one of the recommendations from the Digital Audio and Radio Review that the audio industry should work closely with mobile network operators to promote the build out of robust mobile data networks (5G).

7.27 There are a range of services which give opportunities for these 'emergency communications'. This includes the mobile 'Emergency Alerts' first trialled in April 2023 which can trigger an alarm and message on mobile phones.

7.28 All of the media we use day to day can also often be relied upon to make such broadcasts. However, there are some types of incident where that is not the case, such as those involving a power outage to telecoms equipment. Fixed broadband network providers in the UK have different approaches to power backup. Some use batteries to provide several hours of backup power in parts of their access networks (street cabinets and cabins), while others have no backup at all in this part of the network. Most major network providers have backup arrangements at their core sites, typically using diesel generators, to ensure service continuity during extended power outages. It should be noted that if household power is affected, in-home equipment like routers and TVs typically lack built-in resilience.

7.29 At present, DTT and analogue/DAB Radio can provide a service in circumstances which are not currently addressed by other technologies. Radio and TV masts operate with greater power resilience than most general-purpose telecoms sites, and many consumer owned radios can operate with batteries. That means that in the event of a long power outage, radio can provide a means of communicating with people.

7.30 Similarly in the event of a widespread broadband network outage, DTT and radio provide fallback alternatives which can continue to serve audiences. Conversely, we saw in the weeks following the fire at the Bilsdale DTT mast[117] that the households with internet connectivity were able to still receive TV services, while those without were more cut off.

7.31 Some stakeholders were concerned that any closure or partial closure of the DTT platform might jeopardise the UK's ability to provide national communication broadcasts, including in times of emergency or in the event of major broadband outages. However, other respondents highlighted that, over time, a significant proportion of the population will no longer have access to devices capable of receiving DTT or radio and therefore emergency messaging will not necessarily be able to rely on these technologies to provide the national reach that they provide today. Considering these arguments, and the incremental benefits and costs of DTT in this regard, will be important for the Government as it weighs up the wider public benefits of options which retain the masts and services which underpin these options.

The wider creative economy and competitiveness of UK content providers

7.32 Responses to our Call for Evidence highlighted some broader concerns in the industry that an unmanaged move away from broadcast to online distribution could have knock-on implications for the UK creative economy.

7.33 Several stakeholders made the point that continued funding of multiple distribution networks, each with rising costs and including the funding of long-standing distribution platforms, imposed a significant cost burden on broadcasters that could potentially come at the expense of investing more in content creation. They argued that could potentially flow

[117] Ofcom publishes incident review following Bilsdale Transmitter Fire, Ofcom.

through to a reduction in the volume, range and quality of content that audiences benefit from, including from the PSBs.

7.34 Ofcom's next Review of Public Service Media will consider the sustainability of the PSB system, of which distribution costs are one factor. We will publish an initial scoping document in the summer.

Stakeholder responses

- There was broad agreement that the consequences for other users of the DTT mast infrastructure must be carefully assessed.
- Digital inclusion: Some broadcasters suggested that a small investment in digital inclusion could result in larger social and economic benefits (BBC, Future TV Taskforce, S4C) and the Future TV Taskforce suggested that TV could be a driver for closing the divide. The Welsh Government has flagged that currently devolved administrations have differing approaches and strategies on digital inclusion. Welsh Government has commissioned research into a Minimum Digital Living Standard (MDLS) which considers the type of devices, broadband/mobile data and basic digital skills needed to be digitally included in modern Wales. The work has identified several barriers to achieving MDLS including affordability and the availability and quality of infrastructure to support access.
- Radio: There were questions from a number of stakeholders about how a smaller set of mast users would fund mast operation in the case of a DTT switch off (Nimux, Arqiva). The BBC felt that radio could continue to be profitable without DTT and that the conditions that would necessarily be in place for a DTT switchover would make a radio switchover easier (save for the issue of in car listening). The radio sector noted that the delivery networks are dependent on each other and therefore certainty around DTT would be needed to adequately plan for the future. Nimux suggested that FM and DAB networks could be replanned and moved to smaller, lower cost transmission sites. A consumer raised the question of whether AM/FM should be switched over to IP before or after DTT. It was not clear whether mobile broadband would be a viable alternative. (News UK, BBC).
- PMSE: Many stakeholders were concerned about the impact on PMSE, which some saw as vital to growth of UK creative industries. (BBC, Future TV Taskforce) Stakeholders called for an assessment of the impact on PMSE or said an alternative would need to be found.
- Compression: There were concerns raised about the desire to adopt more efficient technologies in the UK (LG). ISPs and set manufacturers said that the spectrum freed up by a switchover could be usefully repurposed and could assist with providing alternative connectivity to properties with no access to full fibre. However, there was no consensus on how best to repurpose the spectrum. Vodafone suggested the vacated spectrum could help to contribute toward the cost of IPTV distribution.

- Emergency comms: The BBC felt that DTT, FM and DAB may reach a point where they are not resilient and widely available and therefore no longer suitable for emergency communications. Others raised concerns around the reliance on one technology (IP) in order to deliver emergency comms. Nimux suggested that SMS messages might be better for emergency comms.
- Creative economy: Broadcasters said that PSBs' huge positive impact on the creative economy, particularly the UK production sector, is at risk if the move from broadcast to online results in higher, unsustainable costs for PSBs relative to other content providers. (BBC, Future TV Taskforce, S4C)

8. Stakeholder consensus and coordination

The future of TV distribution is a complex cross-sectoral issue which will be shaped by many stakeholders

8.1 The move of audiences towards IP-based services, whether in a managed or organic way, has ramifications across broadcasting, networks, TV manufacturing, and for wider digital inclusion. Ofcom has regulatory duties in a number of these sectors. We have therefore focussed this review not just on the implications for individual sectors but how they intersect with each other. We aim to use our position as the regulator responsible for the telecoms and media sectors to support stakeholders as they plan for the future.

8.2 We received 66 responses to our Call for Evidence, from a range of stakeholders, including broadcasters, internet service providers, consumer groups, TV set manufacturers and individuals. The diverse range of experiences and views about the future have allowed us to lay out areas of agreement and others where there is disagreement. We have also heard from many stakeholders that there are areas where more active involvement from Ofcom and Government would be welcome in order to agree necessary actions across the stakeholders involved and coordinate delivery where appropriate.

8.3 This section summarises the areas of stakeholder consensus and those of disagreement, how different approaches to TV distribution have trade-offs for different stakeholders, before summarising how the respondents felt Government and Ofcom should act to enable collaboration across industries. We finally summarise the work we will undertake as Government assesses this report.

There was agreement that universal provision should be maintained for those who rely on DTT

8.4 Respondents to our Call for Evidence agreed that audience behaviour is changing and that this is changing the market conditions that previously delivered universal access to content. There was also broad agreement that this change is happening to different extents to different audience groups. It was clear that audiences who rely on DTT are more likely to need particular consideration and support and all were agreed that it was important that, however the future looks, those who rely most heavily on DTT should be protected.

8.5 There was agreement that, whatever the future for TV distribution, free and universal access to public service broadcasting should not be degraded. In our assessment of each of the directions of travel in Section 4, we set out that it is not the importance of universality that is in question, but that DTT may not be the only way to deliver it.

8.6 Maintaining the current geographic footprint of DTT has a significant cost compared to a smaller footprint. In the DTT network, the largest 80 masts by coverage address over 90% of

the population.[118] Reaching 98.5% takes a further 1100 masts, and reducing that ambition would therefore make DTT cheaper to operate, and less universal. Any reduction in the level of coverage delivered by DTT would particularly affect rural areas of the UK, and have a bigger impact in Scotland, Northern Ireland and Wales.

Stakeholders agreed certainty for investment is crucial, but can be secured in a range of ways

8.7 Infrastructure stakeholders across the broadband and TV sectors agreed that certainty was needed over the long term future of DTT and other platforms. This is because the investments are long term in their execution and pay-back periods.

8.8 Any of the options for the future of satellite and DTT would require investment, planning, and support for audiences to transition. For example even the replanning of spectrum that would be made possible following a T2 transition or a reduction in the number of multiplexes would likely take 8 to 10 years. A broadband take-up programme seeking near-universal adoption would also likely take significant planning and time to implement. Therefore, even though this report looks at a long time horizon, certainty will be needed soon in order to allow stakeholders across the value chain to begin to lay the groundwork and later execute their plans for the future.

8.9 Whilst there is agreement that a vision is critical for the future, there is nuance in how a plan should be approached. As Government sets its vision, it will need to consider when to enact it. Stakeholders set out some different approaches to determining timeframes for change:

a) **Setting a later minimum date for DTT to continue:** Some stakeholders suggest that DTT should be secured to a certain specific date. The Broadcast 2040+ campaign[119], the Rural Services Network[120] and others told us that guaranteed security for DTT should be made until at least 2040. Broadcast 2040+ said that this would allow for investment to be made that would otherwise need to be held back, either to improve the offering or its efficiency.

b) Set a date for switch off as soon as can be delivered: A small number of stakeholders who believe that managed migration to IP is the correct answer have told us that they want to see a transition as soon as possible. For example, BT said "Given the transition from analogue to digital broadcasting took approximately 10 years, the time to start managing this transition is now."[121] This approach to certainty sets a date for change based on how quickly a switchover process can run.

c) **Conditions for unlocking transition:** The majority of those who felt that the eventual destination for distribution was IP did not set a specific date, with some saying it is too early to decide what should happen to DTT post-2034. In these cases, stakeholders talked about conditions to unlock a managed switchover. For example, the Future of TV Taskforce set out conditions including that "everyone has a reliable, affordable fast internet connection".[122] These stakeholders say that in order to replicate the universality of TV that DTT has so far provided, these conditions are necessary before a switchover

[118] Decision to make the 700 MHz band available for mobile data – statement, Ofcom, p.27.
[119] Broadcast 2040+ response to CfE, p.2.
[120] Rural Services Network response to CfE, p.2.
[121] BT response to CfE, p.10.
[122] Future TV Taskforce response to CfE, p.11.

can take place. There may be a role for Government or Ofcom in determining what the necessary conditions should be, but we note that this does not simply constitute a watching brief for industry, Ofcom, or Government. In fact, many of the suggested conditions relate to ongoing policies (such as Project Gigabit) or policies that the stakeholders wish to see enacted, such as a Government-coordinated digital literacy campaign.

8.10 In all of these cases and however certainty is provided, a decision which would set a target end state for TV distribution and fire the starting gun for preparatory policy and implementation work would need to be made by 2025/26, in line with current Government plans.

All options for the future role of DTT will involve significant trade-offs

8.11 In Section 2, we set out three possible broad approaches to the future of DTT. It is not for Ofcom to decide which one, or combination, of the directions of travel that we have set out is most appropriate. These options are:

a) Investing in a strengthened and more efficient DTT;
b) Reducing the scope of DTT to a 'nightlight', while supporting audiences to move to IP as a primary delivery mechanism; or
c) Support audiences to make a full transition to IP delivery.

8.12 As we note in Section 4, there is a great deal of variation within these options that would need to be considered. However, it is clear to us that this question of setting out a long-term vision is a pressing one that needs to be addressed in the next 1-2 years to allow time for sufficient preparation to ensure audiences do not lose out.

8.13 A vision in the next 1-2 years would give certainty to multiplex operators, leaving eight years until most national multiplex licences are due to expire.[123] This eight year period would allow for most options to be developed and acted on. In any case, Government would also need to consider whether regulatory changes, including to the PSB licensing framework and must offer obligations, may be appropriate. Not only would each of these options take time and planning, they would also require coordination efforts across different industries.

8.14 In setting a future vision for the role DTT plays in the distribution of TV content, there are multiple factors that are relevant to any decision. These include the distribution costs that broadcasters must fund, broadband take-up and digital inclusion, the level of investment required in broadband networks, the efficiency of spectrum use, the impact on radio and emergency communications and the planning and coordination required for any change in approach.

8.15 We have not carried out an impact assessment to fully assess potential effects of each direction of travel for DTT. In time, such an exercise will be an important element of the decision-making process for the future of DTT. This should include consideration of the objectives, benefits, costs, risks, and distribution of impacts on different groups in society. This will require a more fully-fledged specification of the options, including the associated

[123] As detailed in Section 4, some licences expire before 2034.

coordination and implementation details and the evidence base will need to be developed further.

8.16 Nonetheless, to give a sense of the key impacts compared to the current model, we set out below a provisional and high-level summary of the key elements of each approach and the outcomes within the factors we have identified and discussed in earlier sections.

Table 4: Key elements of approaches

	Investment to upgrade DTT	Slim down DTT to a universal 'Nightlight'	Set a course for full switch-off of DTT
Overview of audience proposition	Commit to DTT as a primary universal distribution architecture Seek to establish DTT on a sustainable footing through investment in lower operating cost and energy efficient technology (DVB-T2)	Reduce the scale of the DTT platform to a foundational offer on a single multiplex. This could be a transitional step towards a full DTT switch-off, or a permanent back-stop offering for those homes who choose not to adopt an IPTV service	Set a timetable for complete switch-off of the DTT infrastructure and a managed transition to IP-only distribution, enabling unconnected DTT households to benefit from the additional functionality and services available on IP platforms
Overall distribution costs to the broadcast industry	Highest distribution costs Adopting more efficient technology requires upfront capex, but may reduce ongoing operating costs	Reduces ongoing DTT costs Scale of DTT cost savings would depend to a limited extent on how many services were included, but is largely driven by the fixed costs of DTT mast infrastructure IP distribution costs increase	Reduces ongoing DTT costs to zero IP distribution costs increase materially , but the costs of running two universal distribution networks are avoided
Broadband take-up and digital inclusion	Unconnected homes retain access to a full TV service No impact on broadband take-up	Would need a substantial support programme to improve broadband take-up to avoid homes being left with a reduced TV service Wider societal benefits of a digital inclusion scheme	Would need a substantial support programme to improve broadband take-up to avoid homes being left without a TV service (eroding universality) Connects all homes and provides additional choice and functionality to today Wider societal benefits of a digital inclusion scheme
Investment requirements for broadband networks	Distribution capacity shared between DTT and IP networks	Some extra demand on the IP network to deliver content – legacy DTT network could help deliver highest peak events	Significant extra demand on the IP network to deliver content
Spectrum use & efficiency	Placing all existing services on fewer multiplexes would release some UHF spectrum for alternative use	DTT spectrum requirements reduced – releases some UHF spectrum for alternative use	All existing DTT spectrum eventually released for alternative use

	Investment to upgrade DTT	Slim down DTT to a universal 'Nightlight'	Set a course for full switch-off of DTT
Radio & emergency communications	Retains shared funding model DTT remains backstop for emergency communications	Radio and other users of DTT infrastructure may need to bear more of the cost of DTT DTT remains available as a backstop for emergency communications	Other sectors would need to cover ongoing infrastructure costs previously shared with TV distribution Solutions would need to be found for emergency communications, or rely on IP networks
Planning & coordination requirements	Industry would need to agree funding model for upgrade and spectrum clearance	Industry and Government would need to consider how costs of spectrum clearance (and spectrum auction proceeds) are allocated Planning needed for support scheme to migrate almost all households to IP	Considerable planning across industry and Government required, especially on help for vulnerable households

8.17 It is also important that consideration be given to the distribution of costs and benefits on different groups from these different approaches. In some cases, these distributional impacts may depend on decisions or choices by government or industry. For example, we highlighted above that interventions to ensure the availability and take-up of adequate broadband services may help to protect more vulnerable customers from losing access to their TV services. Decisions would be needed on the exact specification of and approach to funding such schemes, which in turn will influence the distribution of costs and benefits among different groups.

8.18 Distributional impacts should also be considered in the round, as a particular group or business may be subject to a mix of positive and negative impacts, which may offset each other to some extent (e.g. ISPs may need to invest more in capacity if DTT were scaled down, but they may also benefit from attracting new customers and potentially from access to spectrum for mobile network operations).

Stakeholders identified cross-sectoral factors that would be important no matter the direction of travel

8.19 Changes to the commercial landscape have disrupted the value chains that have so far served audiences with free-to-view TV. This disruption has caused stakeholders to identify issues which are likely to be significant regardless of the decision made about DTT. It was suggested that some of these could be resolved through further coordination and, in some cases, stakeholders asked Ofcom and Government to intervene to resolve misalignment in planning between stakeholders and across industry. In general, stakeholders have told us that they are keen to coordinate not just within their sectors but across sectors to ensure good outcomes for consumers.

8.20 **Intermediaries:** A number of broadcasters raised issues between broadcasters and intermediaries. For example, the Future TV Taskforce referred to "increasing 'gatekeeping'

by some TV platforms and operating systems which makes it harder for audiences to find and discover PSB content". Stakeholders noted the important role for Ofcom in setting the Codes of Practice and associated guidance to implement the Media Bill requirements. Alongside Ofcom's work to implement the provisions of the Media Bill (following Royal Assent), we will continue to consider whether connected TV platforms are or could become essential routes to market in ways that may distort competition in the market more generally.[124]

8.21 **Traffic delivery:** There was broad agreement that cooperation would be needed across industries to ensure that efficient delivery of content could be secured. However, BT warned about 'misaligned incentives' when it came to the efficient management of traffic and suggested that this could be managed through legislative change, incentivising players in the value chain to take up the most efficient technologies. Our net neutrality review found that many content providers already take actions to reduce the impact on broadband networks by using services (such as CDNs) or making investments which improve the efficiency of traffic delivery. The review also provided clarity on the flexibility ISPs have to use traffic management measures and offer tailored services to consumers and content providers which allows them more scope to ensure the efficient delivery of traffic.

8.22 **Metadata, login and IP stream sharing**: Some stakeholders felt there were cooperation issues between TV manufacturers/user interface providers and broadcasters, for example around free access to metadata and IP streams from major channels (especially the PSBs). Many of these issues are addressed in the recent Media Bill and we will consider those that are addressed in the Bill as part of our work to implement the new legislation.

Different approaches taken by devolved and local governments will require consideration

8.23 Whilst TV distribution is an issue that affects audiences across the UK, we know that there may be specific implications for particular communities.

8.24 Some of the issues that are central to the question of future TV distribution are dealt with differently across England, Scotland, Wales, and Northern Ireland, such as through different broadband rollout schemes, or differing pieces of devolution legislation.

8.25 As noted in Section 5, coverage of superfast broadband sits at 79% in rural Scotland and 86% in rural Wales, compared to 88% in rural areas across the UK as a whole.[125] Devolved Governments all have broadband rollout campaigns with the ambition of improving access in the future.[126]

8.26 When it comes to DTT, audiences in Northern Ireland who live close to the Irish border can receive DTT signals from Saorview, Ireland's free-to-view DTT platform. As a result of the Belfast (Good Friday) Agreement (1998), the St Andrew's Agreement (2006) and a subsequent Memorandum of Understanding (2010) between the UK and Irish governments, RTÉ and TG4 services are widely available across Northern Ireland via DTT.[127] The Advisory

[124] As set out in Ofcom's Plan of Work 2024-25.
[125] Ofcom analysis of operator data (September 2023).
[126] Project Gigabit (UK-wide), R100 (Scotland), Project Stratum (Northern Ireland), and Superfast Cymru (Wales).
[127] Memorandum of Understanding on Digital Television signed by the UK and Irish Governments.

Committee to Ofcom for Northern Ireland suggested that there would need to be coordination with the DTT platform in Ireland and Irish broadcasters if there was not to be a simultaneous switch-off in the UK and Ireland and that the broadcast of RTÉ and TG4 may need to be protected in the case of a switch off.

8.27 More broadly, recognised regional language broadcasters underlined to us the importance of ensuring access to recognised regional and minority language content.[128] S4C also highlighted the importance of cross-Governmental coordination, saying: "PSBs will play a key role, but the Government is best placed to coordinate these multi-faceted and cross-sectoral issues to ensure positive outcomes. The devolved administrations also have a stake in many of these issues, and we would urge the UK Government to work with the Welsh Government, among others, to also establish a coordinated cross-border approach."

8.28 There are also digital inclusion programmes all over the UK. For example, some campaigns are run by metro mayors which may support any drive to increase broadband take-up. For example, the West Midlands Combined Authority includes digital inclusion interventions in its Levelling Up Growth Prospectus and the Greater Manchester Combined Authority runs a Digital Inclusion Taskforce. Differing policy interventions on both the supply and demand side, by local leaders, are likely to lead to varying levels of broadband take up across different geographies.

8.29 Government will want to consider how it works with devolved and local Governments to ensure that good outcomes for all audiences can be effectively delivered.

Recent commercial decisions and this report mean now is an ideal time for a debate on the future of DTT

8.30 This report aimed to set out an early review of the market as it stands now, as well as what we consider to be the most important factors for the future of TV distribution. While preparing it, we have seen further indications that parts of the industry are moving towards IP. For example, Channel 4 has said that its strategy is to be a "genuinely digital-first public service streamer by 2030".[129] Redundancies at Sky were also linked to customers opting for internet-based TV products over traditional satellite dishes.[130]

8.31 For our part, we are taking forward some further work in order to continue to build our understanding of relevant issues and to shape the conversation as it develops.

8.32 Areas of new work include:

- Barriers to take up and how to overcome them, as set out at 5.28;
- Extension of the industry and consumer forum on usability and accessibility of connected TV, as set out at 6.21;
- Examine the rationale for greater spectrum compression in DTT, as set out in 7.17;
- We will continue our work on content intermediaries, focusing on connected TV platforms, and their potential effects on competition and consumers, as set out at 8.20.

[128] Recognised regional and minority languages refer to Welsh, the Gaelic language as spoken in Scotland, Irish, Scots, Ulster Scots, or Cornish.
[129] Channel 4 press release.
[130] Sky to cut 1,000 jobs as customers move from pay-TV to internet, Guardian.

8.33 We noted that stakeholders felt it would be important to understand viewers' habits, as they develop over the coming years. Our extensive programme of audience, technical and market research, including the Media Nations report, Connected Nations, and Tech Tracker, means that we already track and report on these trends. Our intention is therefore to continue to build our understanding of relevant factors and continue to undertake and publish the audience research we know industry relies upon.

8.34 We remain ready to contribute to analysis where appropriate as Government considers its decisions on the future of TV distribution.