



The Future of Free to View TV

A discussion document

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Section 1

About this document

This document sets out Ofcom's views on the development of free to view television in the UK. Free to view TV platforms are those TV services such as Freeview and Freesat that can be accessed without the need for any on-going subscription charges.

This document considers how current free to view TV platforms might need to develop in the future in order to remain competitive and relevant to viewers, as television platforms increasingly deliver both connected services such as catch-up TV and higher quality pictures such as HD services.

The document also considers the potential long-term options for delivering free to view television, including over broadband networks.

This document will be of interest to the TV industry, mobile network operators, policy makers, consumer groups and other organisations with an interest in the development of free to view TV in the UK. It may also be of interest to organisations involved in the current and future delivery of TV over broadband networks.

This document is not a precursor to any specific regulatory decisions. Instead it provides context to our decision making process around a potential change in use of the 700MHz band of spectrum and also to our engagement in international debates around the future of 470 – 694 MHz spectrum. This document also contributes to the wider public debate around the future of free to view television in the UK.

This document should be read in conjunction with two related Ofcom documents published today:

- our consultation on a potential release of the 700MHz band:
<http://stakeholders.ofcom.org.uk/consultations/700MHz>;
- our Mobile Data Strategy statement:
<http://stakeholders.ofcom.org.uk/consultations/mobile-data-strategy/statement>.

Section 2

Executive summary

Why we are publishing this document now

- 2.1 Broadcasters currently use low frequency spectrum to deliver free to view television to over 98% of homes through TV aerials. In the future, mobile operators may potentially want more of this spectrum to meet growing demand for mobile data services. This puts free to view television at the heart of the debate about the most appropriate future use of valuable low frequency spectrum in the UK.
- 2.2 In November 2012, we published our UHF Strategy. In that document we set out our approach to meeting the demand for low frequency spectrum to meet the growth in demand for mobile data services, whilst also securing the on-going delivery of the benefits provided by digital terrestrial television (DTT).
- 2.3 Alongside this document, we are now publishing our proposals to make the 700 MHz band available for mobile broadband from 2022, or possibly up to two years earlier, including our assessment of the costs and benefits of the proposed change. The proposed change would involve moving parts of DTT and Programme Making and Special Events (PMSE) services from the 700 MHz band to other frequencies. This should result in significant benefits to consumers, such as improvements to mobile networks and cheaper mobile broadband services. We need to ensure this change is achieved whilst safeguarding the important benefits that DTT and PMSE services deliver to citizens and consumers in the UK.
- 2.4 This document is also relevant to the developing international debate around the future of the 470-694 MHz spectrum band. The next World Radio Conference, to be held in 2015, is likely to consider whether this band should be allocated on a co-primary basis to mobile services as well as DTT. This would not require a further change of use of spectrum from DTT to mobile services, but such a change may become an option for the future.
- 2.5 Final decisions on the future use of these bands must be set in the context of a wider view on the development of FTV television in the UK. The UK television market is developing fast:
 - the range of services available is increasing, with new entrants such as YouView entering the market, and with pay television providers such as BSkyB and Netflix developing new “pay-lite” offerings to complement full pay TV offerings;
 - simultaneously, the means of delivery are developing, with aerial and satellite based distribution increasingly complemented by delivery through broadband, known as IPTV; and
 - at the same time, more efficient transmission technologies enable more services to be delivered using the same spectrum, so long as viewers upgrade their TV or set-top box.
- 2.6 This document sets out our thinking on these developments and others and seeks to identify how these developments might affect the interests of consumers and citizens in the UK.

- 2.7 To help develop our views on the future of FTV television, we commissioned analysis from Mediatique, a strategic advisory firm specialising in the UK communications industry. We asked Mediatique to consider the current TV landscape and how it might evolve, to analyse the development of IPTV internationally, to help us understand the options of stakeholders in upgrading the DTT platform and to provide a broad forecast for the development of the UK platform market. The views of Mediatique, published separately from this document, have informed our work and been very helpful in reaching our views, as set out in this document. However, the views contained in their report are those of Mediatique and should not be read as Ofcom's views.

The importance of free to view television

- 2.8 FTV television is TV that is available without an on-going subscription. Since digital switchover, free to view television has been provided primarily through two platforms: (i) a DTT-based platform, marketed as Freeview, and (ii) Freesat, delivered by satellite.
- 2.9 Although many viewers have chosen to pay for TV over the last decade, there is still a strong demand amongst viewers for cheap, simple and widely available TV services. Today, Freeview and Freesat provide the primary means of viewing TV for around half of all TV homes in the UK and for the majority of secondary sets.
- 2.10 Free to view television helps to deliver a number of key policy outcomes:
- a) **Delivering reach and impact of Public Service Broadcasting (PSB):** FTV television ensures that PSB content is universally available and widely consumed, delivering reach and impact for TV content that is important for citizens.
 - b) **Platform choice and range:** FTV platforms add to the choice viewers have for how they receive TV services, with free and pay platforms providing a range of services to cater for different tastes and means.
 - c) **Contributing to the overall level of competition in TV markets:** The added choice of platforms contributes to the overall level of competition in TV and can also benefit viewers in the longer-term by encouraging innovation.
 - d) **Mitigating the potential risk of powerful gatekeepers:** FTV television also provides an additional safeguard in relation to media plurality, by mitigating the potential risk associated with a small number of powerful platform gatekeepers, who could potentially restrict viewers' access to a diverse range of viewpoints.
- 2.11 Current FTV television services, Freeview and Freesat, remain very popular with all sections of the population. While free to view television is disproportionately important for older consumers and DE socio-economic groups, almost half of DTT-only homes are ABC1 and it remains popular across all age and social-economic groups.
- 2.12 However, current FTV television platforms will only remain popular in the long-term if they evolve in terms of the range of content and functionality on offer, in line with wider market developments.

The market around FTV is changing

- 2.13 Given the dynamism of the UK TV sector, free to view platforms are at an important moment in their development and a number of questions are emerging about the evolution of the current models of delivery. In our analysis we have identified three key trends that are likely to be critical in understanding how free to view television will need to develop:
- I. **Greater levels of connectivity:** smart TVs and set-top boxes connected to the internet are driving new functionality such as catch-up and on demand services. Connectivity is also driving new opportunities for broadcasters to offer personalised services for each viewer, such as tailored search and recommendation. It is likely that we are still only in the foothills of understanding the potential for combining broadband networks, the internet and broadcasting.
 - II. **A drive for improved picture quality:** currently high definition (HD) television is considered a premium service, but advances in transmission and compression technologies are taking us beyond delivering simply HD services. There is now significant potential for even greater picture clarity through new technologies such as 4K TV, which is four times sharper than HD. It is possible that these new Ultra High Definition (UHD) technologies will become the premium products of the future, with HD increasingly becoming the basic expectation of viewers. It is also possible that some platforms will become fully HD in the next decade.
 - III. **Development of new services and pricing structures:** as the growth in the number of pay TV subscribers has slowed, pay TV suppliers have begun to look for other opportunities to grow their businesses. In addition, new entrants such as Netflix and Amazon Prime are introducing low-cost on-demand subscription options. We are therefore seeing a new battleground develop around the entry level market segment.

There is an emerging debate about the potential for alternatives to DTT, where more analysis is required to assess long-term options

- 2.14 Currently DTT is the cornerstone technology for providing FTV television in the UK, due to wide coverage and low consumer equipment costs: in total, almost 3 in 4 UK households with TVs use DTT on at least one of their sets. Even most homes that have pay TV on their main set use DTT on at least one secondary set.
- 2.15 There is a debate emerging about the potential for internet protocol TV, or IPTV, potentially combined with satellite, to provide a potential long-term alternative to DTT delivery. This is because IP delivery is becoming more important as viewers use on-demand services and because of the potential future demands on the spectrum used by DTT.
- 2.16 There are a number of criteria that would need to be satisfied for a mass market move from DTT to IPTV to be realistically considered. These include:
- a) **Availability and take-up of superfast broadband:** the Government's current plans will make superfast broadband available to 95% of the population by 2017. This would need to be complemented by driving take-up of these services.

- b) **Take-up of IP capable consumer equipment:** whilst falling prices will bring more IP capable equipment into households, there is likely to be a sizeable minority of people without IP capable equipment.
- c) **Quality of experience:** significant work is likely to be needed to understand how to ensure networks are sufficiently capable and resilient to replicate the quality of experience currently delivered over broadcast networks.
- 2.17 Satellite, through Freesat, could also play a greater role in the future, although the exact role will depend in part on how widespread satellite take-up could be, taking into account coverage, line of sight questions, planning restrictions, the need for landlord consent and other issues.
- 2.18 Decisions about distribution will be shaped by changes in both technology and consumer demand over the next decade. These changes are inherently difficult to predict. Indeed, it is feasible that we will see a more significant change in viewing consumption habits in the 2020s, driven by factors such as:
- the growth and prevalence of IP based platforms in our daily lives;
 - the changing nature of user interfaces and how they guide our choices;
 - increasing speeds and decreasing costs of broadband networks; and
 - the development of new products and services, including by new entrants, which combine high quality content and usability to change current mass market consumer behaviour.
- 2.19 However, whilst we cannot exclude the potential for more radical changes, our base case view remains that DTT will continue to be an important delivery technology for free to view TV over the next decade. We do not currently expect a full switch-off of DTT until post 2030, unless there was significant policy intervention to support a more aggressive timetable for change.

DTT will need to evolve if it is to remain the key transmission technology for free to view television

- 2.20 Digital switchover, completed in 2012, was only the most recent in a series of evolutionary steps for TV, from the launch of ITV in the fifties, colour TV in the sixties, cable and satellite TV in the eighties, digital TV in the nineties, and high definition TV in the last decade.
- 2.21 As we have set out in detail in our consultation on the 700MHz band, we would expect the impact of any change of use of 700MHz spectrum to be manageable from the perspective of the development of DTT, given the limited number of channels currently using the interim multiplexes and the potential to accommodate at least some of those channels through improvements in platform efficiency. Nevertheless, we believe that industry needs to give further consideration to how it wants the platform to develop moving forward.
- 2.22 The reason that clear strategic planning is needed is the nature of the main current DTT service, Freeview. Freeview operates a horizontal model, working with consumer electronics manufacturers to integrate its services into their products. This model has significant advantages in keeping the cost of equipment to consumers low,

but also means that when technology upgrades are needed, there are significant lead times because of the installed base of equipment.

2.23 Based on our analysis of the market we believe that there are two key challenges for the free to view element of the DTT market: connectivity and improving picture quality. We see two potential options for addressing those challenges, which are not mutually exclusive:

- providing more channels and services over IP through hybrid/DTT products.
- upgrading broadcast compression and transmission standards.

2.24 The take-up of connected FTV services is currently relatively low. For this to change, the industry will need to develop a specification that is affordable, easy to use and one which offers compelling new functionality. We are therefore encouraged by reports of discussions amongst DTT stakeholders around a new product, known as Freeview Connect, although the detail of what this will offer is not yet clear.

2.25 In relation to picture quality, there are also opportunities for DTT to upgrade to more efficient transmission and compression standards to create more capacity for higher capacity services delivering HD or UHD channels and content to viewers. Some DTT HD services are already available to consumers with sets that can receive broadcasts transmitted in the MPEG4/DVB-T2 technical standard.

2.26 However, the ability to exploit these efficiencies is constrained by consumer adoption of compatible equipment. Whilst this is increasing over time, it is likely to be some years before a full upgrade of all DTT multiplexes is achievable without significant viewer impact. For instance, on some estimates, only around 80% of homes will have upgraded equipment on their primary sets by 2022. This figure is also likely to be far lower for secondary sets.

2.27 Further into the future, significant efficiencies could be achieved by a transition to compression standards such as HEVC that would allow all channels currently available on DTT to be broadcast in HD, or even for some to be shown in Ultra HD. Again, the central challenge is driving consumer take-up of compatible receiver equipment from an early stage, if the benefits of HEVC are to be realised.

The industry should take the lead in this evolution process

2.28 We would like to see industry drive a long-term strategy for FTV television that includes a credible upgrade path for DTT. While we recognise that Ofcom and Government may need to play a role, the industry is best placed to take action to meet the challenges we have set out, by combining its insights into audiences with the tools it has available.

2.29 Some stakeholders have made the case to us that public policy interventions requiring the upgrade of transmission and compression standards on DTT will be needed and this should be co-timed with any change in use of the 700MHz band. The argument put to us is that the industry alone will not be able to take the necessary steps. The proposed upgrade is to new transmission and compression standards called MPEG4 and DVB-T2.

2.30 Given present forecasts for equipment take-up, we do not see a full upgrade to MPEG4/DVB-T2 at the same time as any potential change of use in the 700MHz band as a credible option at this stage. This view is driven primarily by the scale of

the costs that would be imposed on viewers who needed to upgrade their equipment at this point in time. To address this, industry-led action to drive the take-up of MPEG4/DVB-T2 equipment will be critical in reducing the cost impact on consumers to a point where an upgrade might become feasible.

- 2.31 There are important steps that the industry could take to drive consumer take-up of equipment that supports more efficient standards. For example:
- **Availability of HD content on FTV platforms:** we recognised in our UHF strategy that greater availability of HD content on DTT could drive take-up of new compression standards, a view that was supported by broadcasters. We therefore made available additional DTT capacity to facilitate this. However, the range of HD channels available to DTT viewers remains limited, with broadcasters choosing to make some of their most attractive HD content available exclusively to pay platforms.
 - **Future proofing consumer equipment and providing clear consumer information:** The industry could also provide clear consumer information to ensure consumers understand the tradeoff between receiver costs and the ability to support new services. In particular, as the incremental cost of making all DTT receivers compatible with MPEG4/DVB-T2 decreases, it might be appropriate for all DTT receivers using the Freeview brand to be required to be compatible.
- 2.32 There are also important steps that the industry could take to further the interests of FTV television more widely:
- **Realising the potential of hybrid platforms:** as broadband availability and take-up increases, hybrid platforms can provide further benefits to consumers by offering a greater range of services. This could include more linear and/or non-linear services in standard definition, or potentially in HD or even UHD.
 - **Continuing to review DTT governance arrangements:** whilst we recognise that significant steps have already been taken, it will be necessary to continue to review the governance arrangements for DTT, to ensure that they provide an effective framework for strategic decisions about the long term future of the DTT platform.
- 2.33 Whilst we are willing to consider the potential for regulatory changes to support the ongoing delivery of FTV television, this must be in the context of a clear articulation from industry of its long-term plans for delivering FTV television, backed by the necessary actions. We will continue to monitor developments, to ensure that the interests of citizens and consumers are protected.

Section 3

Why free to view TV matters

Defining free to view television

3.1 The definition of what is FTV television is increasingly complicated. There are a large number of products on the market today, many of which are combining free and pay services in combined products. We believe the following definitions are helpful in describing the range of products available:

“Free services”: no ongoing subscription is required to access the service.

“Pay services”: an ongoing subscription to a pay TV operator for basic functionality and/or premium content.

Within these basic definitions it is also possible to elaborate further, for instance:

“Discretionary Pay services”: meaning a one off payment to secure a piece or portfolio of content (e.g. one-off payments for on demand content).

“Enablement Pay services”: where consumers must pay an incremental ongoing subscription to ensure quality of service and functionality and to benefit from subsidised reception equipment.

3.2 For the purpose of this discussion document, we define free to view television as:

“Any television service that can be consumed without the payment of an on-going subscription charge.”

3.3 In choosing this definition, we recognise that no TV service is absolutely “free”: viewers are required to purchase reception equipment such as a TV set, and potentially a set-top box, pay for a TV licence¹ and cover incidental costs such as power consumption. Nevertheless, it is reasonable to draw a distinction between TV services that can be accessed without any further costs, and those that require an additional on-going subscription payment.

Parliament has given Ofcom responsibilities for ensuring a range of television services and DTT in particular

3.4 FTV television can be delivered by a variety of TV transmission technologies, but the cornerstone of free to view television in the UK is currently DTT.

3.5 Under the Communications Act 2003, Ofcom has specific responsibilities for the regulation of DTT that go further than our responsibilities for other television platforms, reflecting the role that DTT has in making PSB available to all. Specifically, our duties under the Act require us to secure both the optimal use of the electromagnetic spectrum, and the availability throughout the UK of a wide range of TV and radio services which (taken as a whole) are both of high quality and calculated to appeal to a variety of tastes and interests. We are also required to have due regard to the desirability of promoting the fulfilment of the purposes of PSB in the UK and

¹ With the exception of households with at least one member who is over-75, where the TV Licence is provided free of charge.

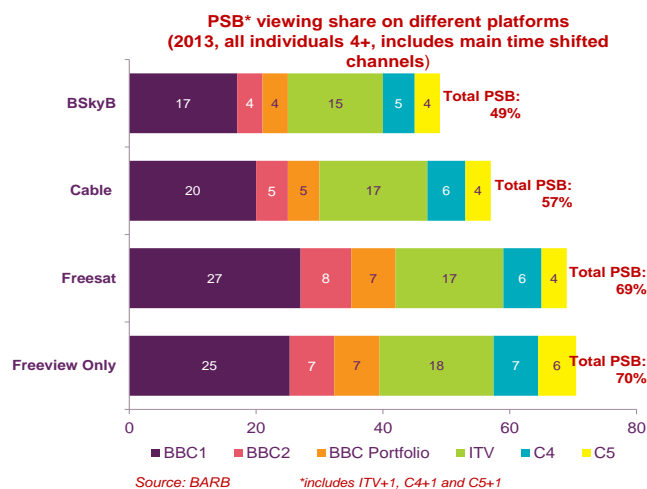
promoting competition in relevant markets. And in performing our duties we are required to have regard to, in particular, the interests of consumers in respect of choice, price, quality of service and value for money.

- 3.6 While this document considers current and future alternatives, we have therefore focussed on DTT. This is partly because of the central role for DTT, both in terms of numbers of viewers and because of its unique role in ensuring universality, but also because we are in the process of taking decisions on the use of low-frequency spectrum.

Policy benefits delivered by the current model of free to view TV

- 3.7 The widespread availability of FTV television has supported a range of policy benefits. Chief amongst these is promoting the reach and impact of PSB. It is important for PSB content to be readily available and widely consumed: free to view television services support this by ensuring that citizens are not priced-out of consuming public service content. In doing so, FTV television supports the efficiency and efficacy of the public interventions that provide PSB.
- 3.8 The primary means of achieving widespread coverage of PSB content has been the near-universal coverage of DTT, which can be accessed by around 98.5% of UK households². Satellite TV platforms also provide wide coverage, including in those areas where DTT does not provide coverage, although a clear line-of-sight between the dish and the satellite is required. Planning requirements and landlord/freeholder requirements may also reduce true coverage. We discuss satellite coverage further in Chapter 5.
- 3.9 PSBs have typically enjoyed higher viewing shares on free television platforms, relative to pay platforms. In turn, this higher market share helps underpin commercial PSBs' advertising revenues and viability, as well as the BBC's reach and impact. This in turn supports significant investment in UK original content, meeting the aims of public service broadcasting and supporting a very successful UK creative sector.

Figure 1: PSB viewing share on different platforms (2013, all individuals 4+, includes ITV+1, Channel 4+1, Five+1)



² Coverage of around 98.5% of households is achieved by the three PSB multiplexes, ensuring the most popular DTT channels are widely available. The three commercial multiplexes have coverage of around 90% of households, and coverage of the interim multiplexes is expected to reach around 70% in due course.

- 3.10 FTV television platforms may also contribute to the overall level of competition in the TV market. The presence of strong free to view platforms can provide incentives for pay TV providers to innovate in terms of functionality, content investment and/or pricing structures.
- 3.11 Free to view television platforms also play a role in mitigating the risk of powerful gatekeepers. This helps prevent any one individual or organisation gaining undue influence over the UK's media landscape, for instance by unreasonably restricting the route to market for certain channels or services. They act as an additional safeguard in mitigating the potential risk of a small number of powerful platform gatekeepers, who could potentially restrict viewers' access to a diverse range of viewpoints.
- 3.12 Consumers have also benefitted from the additional choice provided by FTV television platforms. Specifically, FTV television services have typically offered a simple and cheap consumer proposition: they are easy to understand, install and use. DTT tuners are provided as standard in virtually all new TV sets sold in the UK. Freesat has also provided a wider choice of channels than Freeview, suitable in particular for households with a satellite dish already installed.
- 3.13 While the technology and the market context for delivering FTV television may change over time, we do not see these policy goals as likely to diminish, even in the long-term. However, it is important to be clear that we do not have a particular objective around supporting any particular platform, free or otherwise, and individual consumers should be able to switch from free services to pay services (or vice versa).
- 3.14 Nevertheless the policy benefits outlined here indicate a clear interest in maintaining a balanced broadcasting ecosystem in the UK that provides a choice of platforms and services for viewers. In the remainder of this document we will explore how this objective might be achieved.

Section 4

The changing market context

The UK TV market is innovative and dynamic

4.1 Following digital switchover the TV market continues to evolve, with ever more choice for viewers and new technologies being offered such as IPTV and the increased availability of HD channels, alongside more established developments such as personal video recorders (PVRs). In addition, pay platforms continue to proliferate and innovations such as the availability of on-demand services, interactivity and personalisation – all enabled by internet connectivity of TVs and/or set-top boxes – continue to become more important features for many viewers.

4.2 These are exciting developments from the perspective of the viewer. There is more choice and options than ever before from a wide range of providers, including many new entrants, such as Netflix, Amazon, Tesco and others.

4.3 These opportunities are being driven by developments in technology, consumer behaviour and commercial strategies:

Networks: the prevalence of current generation broadband and the rollout of next generation broadband has seen a step change in IP penetration. Internet access has reached over 80% of UK homes and average speeds are now 17.8 Mbps. Network capability is a key enabler of successfully delivering content through broadband.

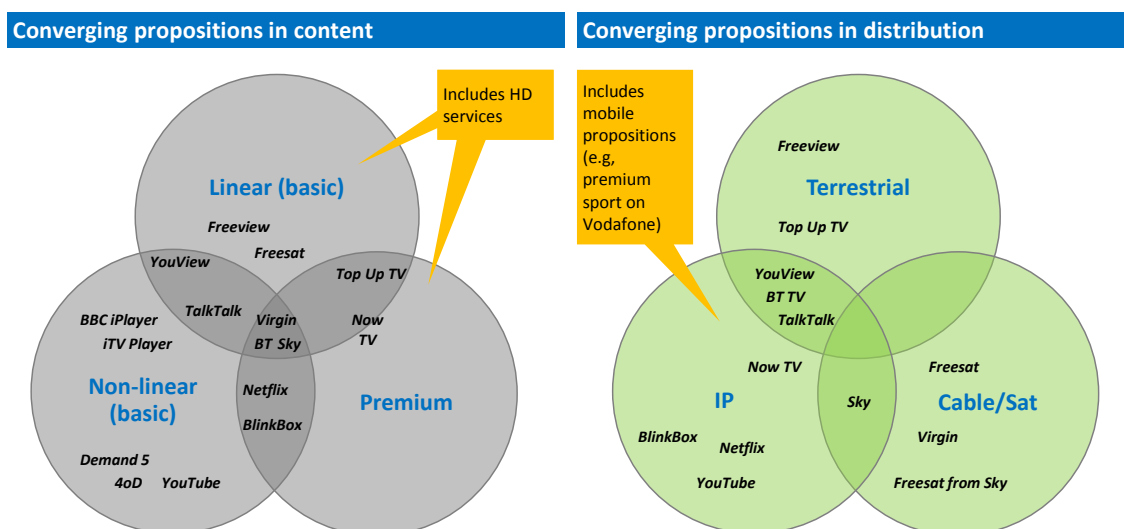
Devices: there has been an explosion in the range and use of internet enabled devices, with traditional TVs being challenged by Smart TVs and secondary sets being challenged by tablets. In addition, smartphones and tablets are bringing us TV on the go.

Commercial strategies: traditional TV providers have sought to extend their distribution footprints to emerging networks and devices, with PSBs launching on-demand players and Sky, BT, Talk Talk and others launching hybrid broadcast/IP distribution networks.

Consumer behaviour: viewers are embracing new opportunities to view content, with consumers increasingly expecting content to be available anywhere, anytime.

4.4 These broad developments are enabling convergence in content propositions and distribution options, creating a more complicated environment.

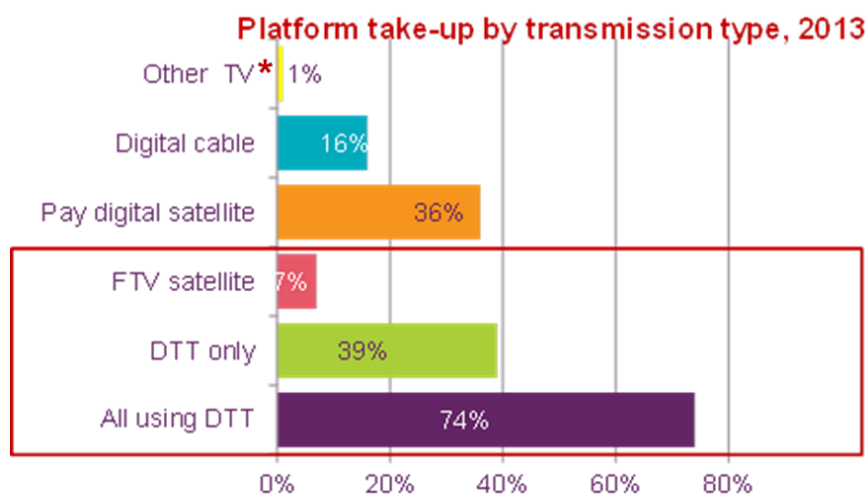
Figure 4.1: Impact of converging content delivery and distribution on TV platform market



Source: Mediatique

DTT-based platforms continue to be the most popular means of watching TV

4.5 Nearly three-quarters of UK households with TVs currently have access to DTT in some form, whether it is through their primary set or secondary sets. Even homes that choose to pay for TV often use DTT on secondary sets: over half of homes with cable or satellite pay TV services also use DTT on at least one set.



Source: BARB Establishment Survey Percentage of UK TV households
 * Includes IPTV platforms such as BT Vision

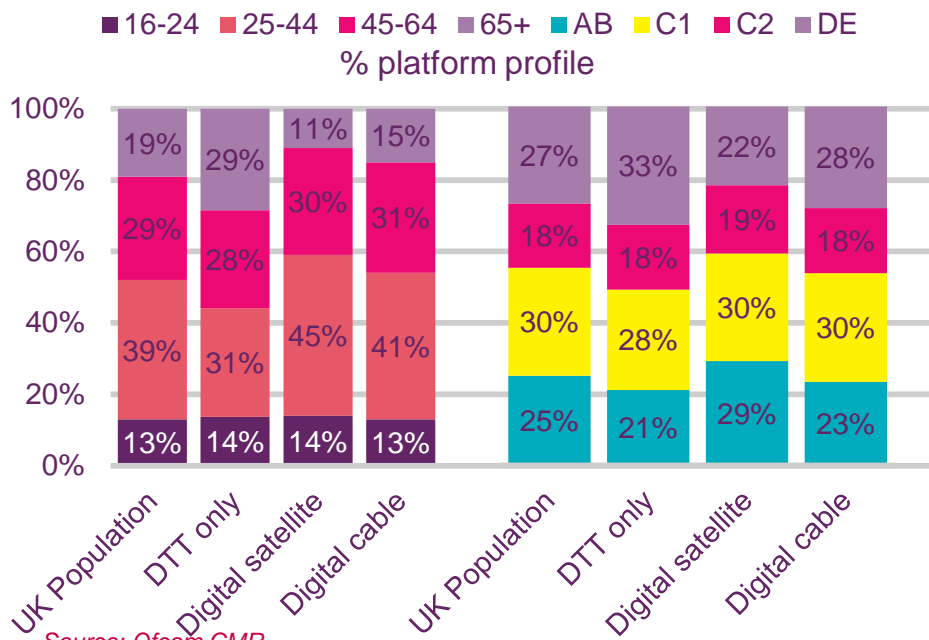
4.6 The reasons for DTT's continuing popularity include:

- it is a simple, cheap consumer proposition and easy to install;
- it has a wide range of attractive content: even on pay TV platforms, the channels available through DTT account for the majority of viewing;
- equipment is cheap and DTT receivers are universally integrated into new TVs and widely available from a range of manufacturers;

- some added functionality is available for those who want it e.g. PVRs, connectivity, and a number of PSB and commercial channels available in HD; and
- it is widely available: around 98.5% of the UK population can access the three PSB multiplexes.

4.7 As seen from the chart below, DTT as a technology tends to be disproportionately important for older consumers and DE socio-economic groups. Nevertheless it is also important this effect should not be over-emphasised: almost half of DTT-only homes are ABC1 and it remains popular across all age and socio-economic groups.

Platform demographics by age, socio-economic group



Source: Ofcom CMR

4.8 Following on from the success of Freeview, Freesat, a free to view digital satellite television joint venture between the BBC and ITV, was launched as an alternative in 2008. It offers a larger range of channels, without any subscription. Freesat has also been successful, in particular offering a FTV option for households who have ended Sky subscriptions and for those who do not receive DTT coverage from all six national DTT multiplexes (around 10% of UK households).

4.9 Today, Freesat is available in almost 2 million homes.

A number of market developments may challenge FTV platforms in the future

4.10 Given the dynamism in the UK TV market, free to view platforms are at an important moment in their development and a number of questions are emerging about the evolution of the existing model of FTV television and the landscape in which it will operate.

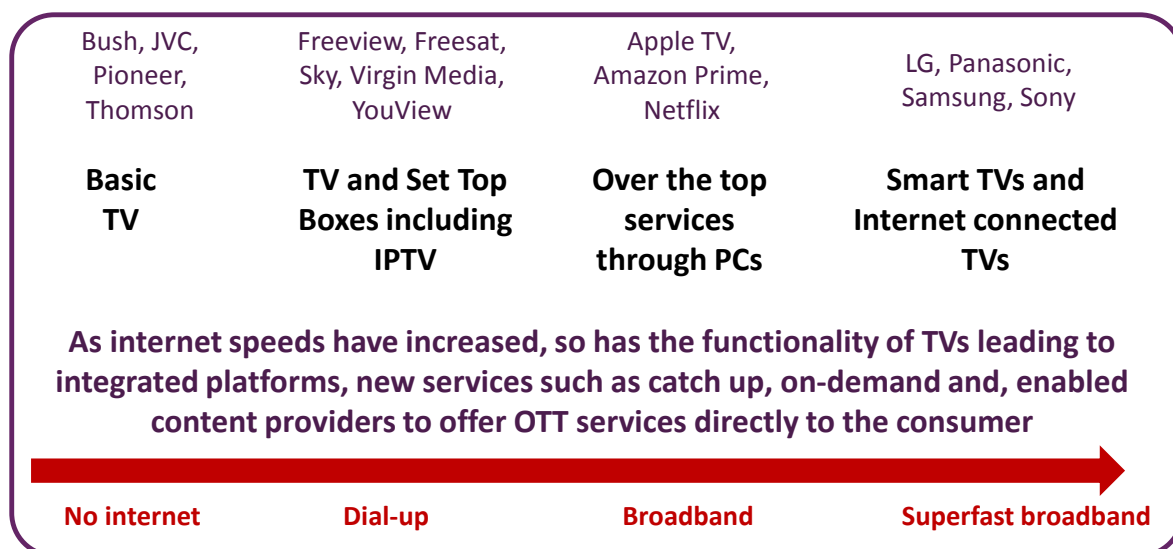
4.11 We have identified three key trends that are likely to be particularly important to consider over the next decade.

- I. **Greater levels of connectivity.** Smart TVs and set-top boxes connected to the internet are driving new functionality such as catch-up and on-demand services and opportunities to access paid-for content. Connectivity is also driving opportunities for advanced search and recommendation features, which are more important as the range of content available to viewers increases, with a focus on personalisation, so that the TV-viewing experience can be adapted to individual viewer tastes. Finally, connectivity is opening up opportunities for the delivery of streamed live TV, which is important in particular for capacity-constrained TV transmission modes such as DTT.

In addition, broadcasters are just beginning to explore the potential of data collected through greater connectivity to enhance their consumer propositions.

This trend towards connectivity is driven in part by improvements in broadband access networks, which are making internet-based delivery of TV content more feasible: the current average broadband download speed of 17.8 Megabits per second is capable of delivering high-quality, unbuffered TV viewing (although resilience remains an issue for internet-delivery).

Greater levels of connectivity

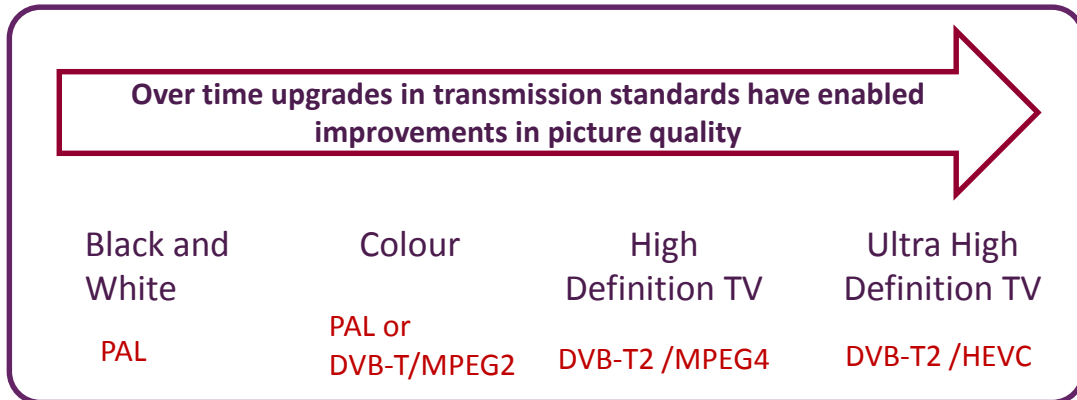


- II. **A drive for improved picture quality.** Currently HD television is considered a premium service, but advances in transmission and compression technologies are taking us beyond delivering simply HD services. There is now significant potential for even greater picture clarity through new technologies such as 4K TV, which is four times sharper than HD. It is possible that these new Ultra High Definition technologies will become the premium products of the future, with HD increasingly becoming the basic expectation of viewers.

Indeed, it is possible that UHD may emerge as the “premium” picture quality option, with HD becoming the default expectation for consumers. This effect may be accelerated if some TV platforms may become fully HD in the next decade.

The current evidence on viewers' appetite for HD services on FTV platforms is currently mixed. Consumer research³ has highlighted that some see HD as important on DTT: 74% of DTT households stated that they expected to receive either most or all DTT channels in HD in the future and more than half (59%) of DTT households stated that there is not enough HD content currently available on the platform.

A drive for improved picture quality



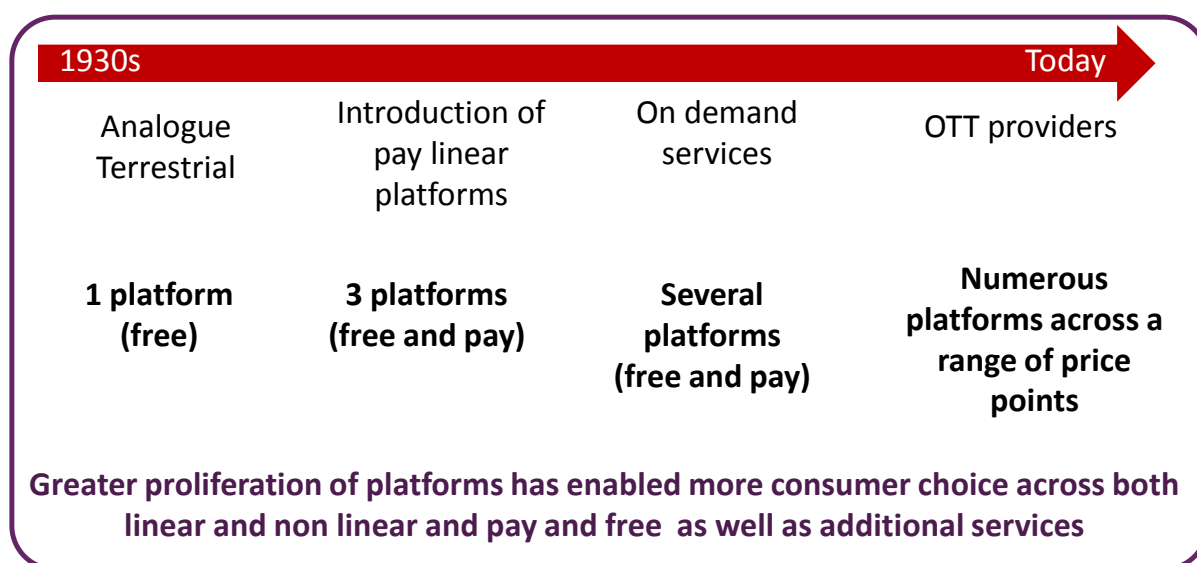
- III. **Development of new services and pricing structures:** As the growth in the number of pay-TV subscribers has slowed over time, pay TV suppliers have looked for ways of attracting viewers who have a lower willingness to pay for TV. This is demonstrated by the emergence of new low-cost “pay-lite” TV services from Sky (Now TV), as well as through the emergence of YouView as primarily an “enablement-pay” platform (where YouView set-top boxes are typically bundled with BT and TalkTalk broadband services).

Separately we have seen the emergence of a category of low-cost connected TV platforms from non-traditional providers, such as Netflix and Amazon Prime, which offer access to a library of on-demand content and are typically consumed as a complement to traditional linear services. Part of the driver of this trend has also been the proliferation in the number of devices that can be used to access or view connected TV platforms, including tablets, mobile phones and games consoles.

This suggests that the key battleground is going to be around homes that do not currently choose to take a traditional pay offering: the low- to mid- ARPU market segment. This will intensify the competitive pressure on current FTV television offerings.

³ Source: Freeview/Kantar Media quantitative research, May 2012, as referenced in Digital UK consultation on Freeview HD genre, published May 2013.

New TV platforms and services



- 4.12 FTV platforms will therefore need to recognise and respond to these drivers, otherwise they risk losing attractiveness and relevance to all but a small, dedicated viewer base. In the following chapters we explore how they may do so.

Section 5

Long term options for the delivery of free to view TV

- 5.1 FTV television in the UK is currently delivered predominantly by DTT through households' TV aerials, complemented by satellite delivery via Freesat. In the future, the options for delivering FTV television will include DTT, satellite and IP networks, either individually or in combination.
- 5.2 In this section, we look at the long term options for the delivery of FTV television in the UK, beyond DTT. We do so not to suggest a preferred long term option, but to inform the public debate about what the options might be.

IPTV offers great potential in the long-term

- 5.3 Over the last few years there have been several developments in technology and consumer take-up of technology that makes IPTV a more exciting prospect:
- The rollout and take-up of superfast broadband, which allows IPTV to provide consumers with an increasingly good quality television experience without buffering, channel switching delays or other problems such as picture blocking;
 - The growth of on-demand viewing and IP functionality such as interactivity and personalisation. Just over half of online users (54%) say they watch TV programmes online on any device;
 - Growing consumer-take-up of connected TV sets and set-top boxes. YouView is the main mass-reach television platform making IP only channels available to consumers. BT provides BT Sport in SD and HD as well as a range of pay channels to its superfast customers and TalkTalk transmits Sky's entertainment, sports and movies channels, amongst others, to its customers. Sky has also launched Now TV, which allows subscribers to watch live Sky TV channels as well as catch-up content.⁴ Other devices such as Roku boxes and Connect TV on Freeview HD devices allow viewers to stream live television;
 - Developments in IP "multicast" (see figure 5.2) and more efficient video compression technologies⁵ which will allow broadcast TV services to be more efficiently delivered over the internet.

The experience of IPTV delivery in other countries is very mixed

- 5.4 Analysis commissioned from Mediatique shows that in some international markets IPTV services are more developed than in the UK. For example, France has the highest household IPTV penetration worldwide: 32% of households in France used IPTV as the primary means of watching television in 2012 and France's IP multicast

⁴ At present Now TV requires users to have a minimum broadband download speed of 2.5 Mbps and a compatible television set, set-top-box, or device.

⁵ HEVC potentially doubles the compression of video content when compared to the MPEG-4 standard. This will make distributing video content online much more efficient and open the possibility of Ultra HD content. http://iphome.hhi.de/wiegand/assets/pdfs/2012_12_IEEE-HEVC-Overview.pdf

network reaches over 90% of households.⁶ Conversely, Italy has less than 1% IPTV penetration. The table below summarises the market structures and dynamics across a range of countries.

Figure 5.1 A snapshot of IPTV across the world

	France	Germany	Italy	Sweden	South Korea	USA
TV households	27m	38m	25m	5m	20m	114m
DTT standard	DVB-T	DVB-T	DVB-T	DVB-T/T2	ATSC	ATSC
IPTV penetration	32%	5%	0.1%	14%	14%	8%
HD over IPTV	Full suite available subject to network speed *	Full suite available to VDSL households*	Not available	HD suite available to certain households*	Full HD suite available*	Full HD suite available*
Main IPTV providers	Orange, Free, Bouyges Telecom, SFR	Deutsche Telekom, Vodafone	Telecom Italia	TeliaSonera, Telenor, Fast TV, regional players	LG, SK Broadband, Korea Telecom	Verizon, AT&T, regional players
Fixed broadband penetration	79%	82%	59%	87%	98%	72%
Average broadband speed	6.5 Mbps	7.6 Mbps	4.9 Mbps	9.3 Mbps	22.1 Mbps	9.8 Mbps
T2 transition	2020**	Not set	Not set	2020	N/A***	N/A***
VOD market	Broadcaster portals plus DTR; SVOD market small	Emerging VOD market	Small market, dominated by incumbent broadcasters	Large and competitive market	Large and competitive market	Large and competitive market

* Although HD services are available over IPTV, in all cases they appear to cause significant reduction in available speeds for other internet services being used simultaneously. A high speed internet connection and significant/managed bandwidth is therefore required, and often services are limited or unavailable if multiroom packages are taken

** Under consultation

*** South Korea and USA use the ATSC standard for terrestrial broadcasts, unlike Europe which uses the DVB-T standard

Source: Mediatique for Ofcom, 2014

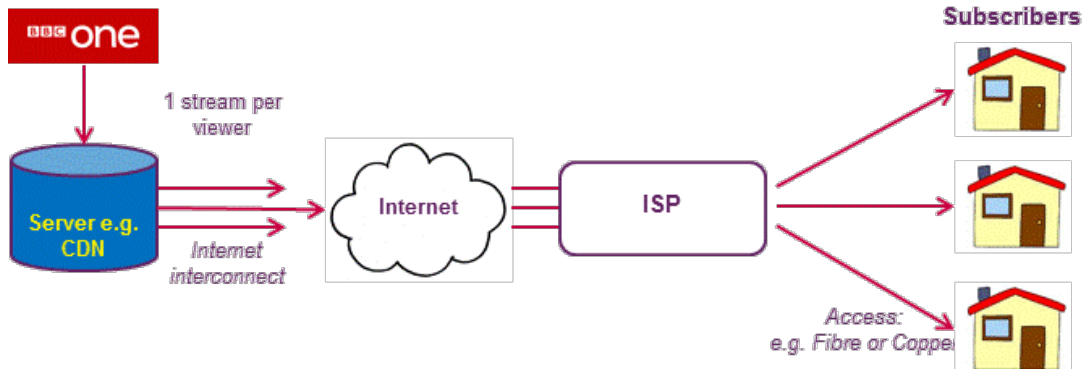
5.5 In order to understand the potential for IPTV delivery, it is important to differentiate between two modes of delivering content over IP networks: multicast and over the top (OTT).

⁶ Mediatique report: *the development of free to view television in the UK by 2024*. See Section 3: the role of IPTV in international territories.

Figure 5.2 How can broadcast video content be delivered over the internet?

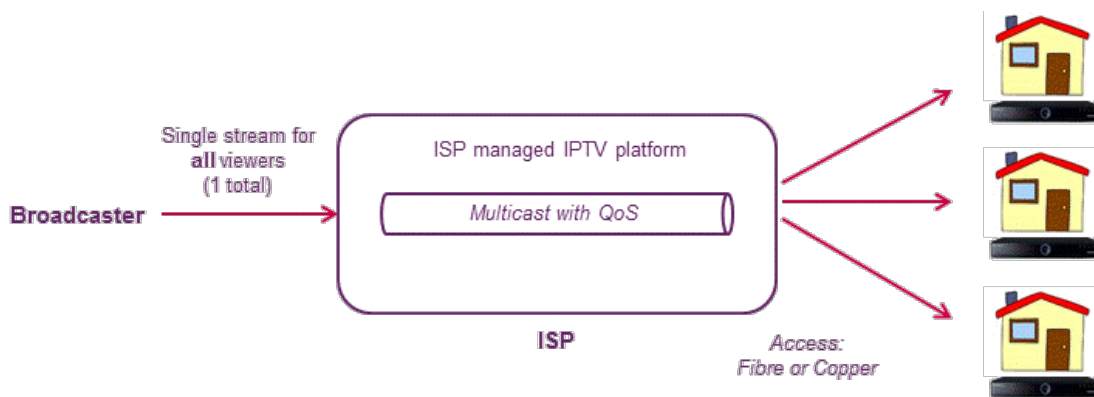
IPTV can be delivered in two broad ways, either through the open internet (“over the top”) or on services with bandwidth managed by the ISP.

Over-the-top (OTT) is where a dedicated video stream is sent from a server to each viewer when a piece of content is requested. Any device connected to the internet can access the content and quality is dependent on the internet connection and the ISP. Broadcasters often buy services from content delivery networks (CDNs). CDN providers place servers as close to end-users as possible, to improve the viewer experience and minimise network costs.



Multicast is an example of a technology deployed by ISPs that allows them to deliver the same content to multiple homes rather than having to send out individual streams to each user. As such multicast technologies can provide audiences with a much higher quality television experience. Linear channels are streamed once to each telephone exchange or fibre cabinet and then over individual broadband lines on request. Traffic in the ISP backhaul networks is reduced significantly for large channels and no CDN is required.⁷

The ISP controls the whole process so they can also offer a guaranteed Quality of Service. This avoids the ‘glitches’ often experienced when watching video online – providing a broadcast quality consumer experience to the TV using a set top box provided by the ISP.



Services managed by ISPs using multicasting can make distributing linear television streams much more economical: in the hundreds of thousands of pounds per year. The technology also allows for large audiences as the content can be replicated in the ISP exchange rather than at the source by the content provider or content delivery network.

⁷ BT and TalkTalk both use multicast to provide content to their YouView subscribers. BT provides Sport and a number of HD channels to its FTTC customers using its own multicast product. TalkTalk provides SD content on its own ADSL network, and buys a wholesale multicast product from BT to provide content to its fibre customers.

A number of areas would need further exploration if mass market delivery of FTV television over IP was ever to be considered

- 5.6 The main strength of DTT is that it combines near universal reach with significant network resilience, to ensure great network reliability from a viewer's perspective. This is in contrast to IP delivery of content, where there have been a number of recent high profile examples of failure of IP networks to replicate that resilience. These include Sky's Now TV service failing for some viewers on the last day of the 2013/14 Premier League football season and the HBO Go service in the US failing due to significant simultaneous demand for the premiere of the new season of Game of Thrones.
- 5.7 In the table below we have set out some of the key considerations that would need to be taken into account when assessing the potential for a mass market switch to IP delivery.

Figure 5.3 The conditions needed to make a mass market switch to IP

Condition	Where are we now?	What needs to be done?	UK readiness for mass market IPTV
Universal availability of superfast broadband	<p>Superfast broadband will give greater opportunities for HD picture quality and could support a more reliable experience.⁸ Some current generation broadband connections are also able to support IPTV services (see Figure 6.1).</p> <p>Superfast broadband is currently available to 75% of the UK population.</p>	<p>UK Government's policy is speeds of at least 30Mbit/s for 95% by 2017.</p> <p>Solution needed for the final 5% to receive a good enough broadband connection for IPTV.</p>	Medium
High take-up of broadband	<p>73% of adults have a fixed broadband connection.</p> <p>25% of connections are now superfast – offering headline speeds of 30Mbps or more.</p>	<p>We expect at least 90% of households to have broadband by the mid 2020s⁹</p> <p>Potentially up to a quarter of consumers will not have superfast broadband by the mid 2020s.</p>	Low

⁸ Broadband speed research published by Ofcom in April 2014 indicated that average broadband speed in the UK was 17.8 Mbps as of November 2013, although average download speeds in urban areas were almost three times those in rural areas.

⁹ Source: Ofcom Technology Tracker. Q1 2014

Condition	Where are we now?	What needs to be done?	UK readiness for mass market IPTV
Near universal take-up of IPTV capable consumer equipment	Estimated that 27% of television sets are connected to the internet. ¹⁰	Falling prices, TV replacement cycles and new products could bring more IP capable equipment into households by the mid 2020s. Potential for a sizable minority of people without IP capable equipment.	Medium
A solution for people unable to receive IPTV	Satellite could act as a solution for those unable to receive broadband at a sufficient quality for IPTV. Equipment and installation costs may prevent a barrier for some viewers.	Further work required on coverage of satellite in the UK. More work needed to understand the overlap between those unable to receive satellite signals and those unable to receive broadband.	Medium
Broadband infrastructure capable of delivering mass-reach IPTV - A quality IPTV consumer experience - A resilient IPTV connection	Some frustrations with watching TV online such as slow channel switching and buffering. It is unclear how networks will cope with millions of people watching the same content at the same time without interruptions or lags in programming.	Unlikely that OTT services will be able to deliver a reliable enough TV service. More work needed to understand potential of multicast. ISPs can ensure their customers receive a guaranteed quality of service. BT has rolled out multicast to most of its superfast broadband network ¹¹ and TalkTalk has multicast on its ADSL broadband network.	Medium
Sufficient protection for broadcasters against unwarranted traffic management	Existing framework could prevent significantly unwarranted traffic management practices	More consideration needed as to whether further protection for broadcasters might be required.	Low
Commercial agreements between broadcasters and ISPs	A new model of FTV television based on IPTV would introduce new commercial dynamics. Broadcasters will need to rely on ISPs for distribution on a bigger scale than today.	The relationship between the ISPs as distribution platforms and broadcasters as content providers has not yet been tested. For example, there could be a concern that the ISPs could act as new gatekeepers over the distribution of broadcast services over IP. Especially if content providers have to rely on their managed services to provide a quality TV experience.	Low

¹⁰ Ofcom Communications Market Report 2013. 130.

¹¹ BT sells its multicast product wholesale to other broadband providers.

Satellite could also play an important complementary role in future

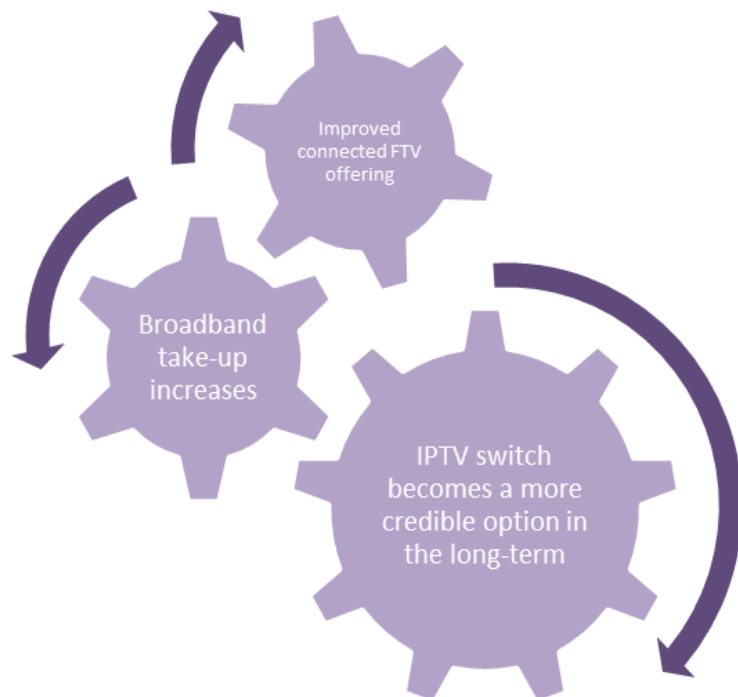
- 5.8 Freesat continues to grow its customer base as Freesat receivers are built into an increasing range of TV sets, and driven by improving functionality and falling prices. That said, equipment and installation costs remain higher than DTT and it is perhaps unlikely therefore that the majority of DTT viewers would choose naturally to replace their DTT receivers with Freesat receivers. Satellite is therefore likely to remain a less widespread FTV choice than DTT, positioned primarily for those viewers particularly keen to receive a wider range of content subscription-free and or those viewers choosing to end a subscription with Sky.
- 5.9 One potential obstacle preventing a policy-driven shift towards relying on satellite as a primary transmission mode for FTV television is the challenge of achieving near-universal coverage, even in the long term. Some premises do not have the necessary clear line-of-sight with the relevant satellite such as obstructions from nearby trees or buildings. Other households remain unable to install satellite dishes, for instance because they require landlord or freeholder permission or due to planning restrictions. A specific challenge is also experienced by households within a Multiple Dwelling Unit (MDU) with no internal satellite distribution system and where there is no possibility of installing an individual dish.
- 5.10 Due to the local and fragmented nature of these challenges, it is difficult to provide a precise estimate of the effective level of satellite coverage, achievable at reasonable cost. However we currently estimate that, when considering all of the challenges set out above, coverage is likely to be less than 95% of UK households: in other words, lower than the level of coverage provided by the three PSB DTT multiplexes. We recognise that some of these challenges might be addressable, for instance by use of non-standard satellite installations, or by further roll-out of internal distribution systems within MDUs, although these responses may lead to increased consumer installation costs.
- 5.11 Nevertheless, these challenges are not necessarily of the scale that would prevent satellite potentially playing an increasingly important role as a complement to other technologies. In particular, if the conditions for a shift towards IPTV are met in the future, there may be a crucial role for satellite in providing a FTV option for those households who cannot (or choose not to) access a broadband service of sufficient quality to facilitate a satisfactory viewing experience.
- 5.12 Separately, there is significant interest internationally in the development of a converged mobile / broadcast standard - known as eMBMS - that could make use of LTE technology to deliver live broadcast services to both mobile handsets and TV sets in the home. While at this stage the technical and commercial viability of such a service is unclear, these developments present a theoretical opportunity to achieve significant spectral efficiencies as well as a stronger mobile offering for free TV platforms.

Hybrid delivery can provide a stepping stone approach to mass market delivery via IP networks

- 5.13 One realistic scenario is a gradual evolution towards IP distribution, through hybrid distribution models. This evolutionary approach through hybrid platforms has a number of attractions:

- a) **Hybrid platforms can help alleviate concerns about DTT platform capacity:** IP delivery can provide greater choice on platforms which are constrained by spectrum capacity.
- b) **There is the potential for higher bandwidth services to be delivered over IP:** services broadcast in HD or UHD may be able to be provided over superfast broadband networks, reducing the pressure on potentially limited spectrum availability in the future.
- c) **Hybrid platforms can help us better understand resilience and capacity issues:** because further work is required to understand the exact nature of resilience and capacity of IP networks to genuinely mass market delivery.
- d) **Hybrid platforms can drive take-up of broadband:** as internet connected television becomes more popular, and consumers see tangible benefits, it could help drive superfast broadband penetration. We see a potential positive feedback loop with improved connected FTV offerings driving superfast broadband take-up, which in turn makes an IPTV switch a more credible option, should that prove desirable. This in turn could further drive broadband take-up.

Figure 5.4 Driving IPTV in the long term



Section 6

Evolving DTT in the medium term

- 6.1 On the basis of the above analysis, and while we cannot exclude the potential for more radical changes, our central view remains that DTT will continue to be a very important delivery technology for FTV television over the next decade. Furthermore, we do not currently expect a full switch-off of DTT until post 2030, unless there was significant policy intervention to support a more aggressive timetable for change.
- 6.2 Therefore, it is important to consider how DTT may need to do to evolve to meet the changing expectations of viewers in this period.

We expect the impact of any future change of use of 700MHz spectrum would be manageable from the perspective of FTV television policy

- 6.3 A future change of use of 700MHz spectrum band would have one main consequence: the closure of the interim multiplexes that currently broadcast using the 600MHz band of spectrum. These interim multiplexes have lower coverage than the permanent multiplexes, although coverage is anticipated to grow in the near future to around 70% of UK households. The interim multiplex currently in use broadcasts HD versions of BBC Four, CBeebies, BBC News, Al Jazeera, and the Community Channel as well as Al Jazeera Arabic in SD.
- 6.4 These multiplexes broadcast under a licence issued by Ofcom that runs until 2026, but with a minimum duration to the end of 2018, subject to 24 months' notice. This reflects the fact the multiplexes were made available to support the transition to MPEG-4/DVB-T2 standards, rather than as a permanent feature of the DTT system.
- 6.5 It is possible that some channels on the interim multiplexes, notably the BBC HD channels, could be carried on multiplex B, which already broadcasts the other Freeview HD channels. At the moment multiplex B carries five full 24 hour streams but it is likely to be able to carry more over time as compression and multiplexing techniques improve. If the BBC, which operates multiplex B, moved its HD services from the interim multiplexes to multiplex B this would also extend their availability from around 70% to 98.5% of UK households.
- 6.6 As part of our work, we commissioned Mediatique to consider the possible impact on DTT platform penetration of greater consumer demand for HD content. They found that should this materialise, DTT penetration could fall following a change of use of the 700MHz band as a result of it having less choice of HD services than other TV platforms. Nevertheless, any fall in DTT penetration is, in our view, unlikely to be significant enough to undermine the policy goals achieved by FTV, particularly since many viewers may in any case choose to switch to Freesat. Furthermore DTT stakeholders are able, either individually or collectively, to take various steps in order to prevent such a decline.
- 6.7 Given this we consider at this stage that the closure of the interim multiplexes would be unlikely to present a material threat to the viability or attractiveness of DTT-based platforms. Clearly this is an area we will need to keep under review. It may be that, if new services launch on the interim multiplexes that are valued by viewers we would need to reconsider this assessment.

If further capacity is needed, there are options for industry to explore to evolve the DTT platform

6.8 Should there be a need for further capacity for DTT, either for SD, HD or UHD services, we see two options which we believe industry should consider further:

- **Provide more channels over IP through hybrid DTT/IPTV platforms:** we understand that Freeview and Digital UK are currently designing a new DTT/IPTV hybrid platform referred to as Freeview Connect. Together with the evolution of YouView, this could provide a route to more capacity by combining DTT with IP delivery, including potentially more HD services.
- **Upgrades in compression and transmission standards:** Broadcasters could switch further multiplexes to the MPEG4/DVB-T2 compression and transmission standard, allowing more channels to be fitted onto each multiplex. The two interim DTT multiplexes use these standards and make available a number of additional SD and HD channels on Freeview HD sets. This is encouraging consumer take-up of MPEG4/DVB-T2 equipment.

6.9 We note that these options are not mutually exclusive.

Providing more services through DTT/IPTV hybrid models

6.10 As consumer take-up of Smart TVs and connected set-top boxes increases, operators may have more incentive to consider IPTV as an alternative to DTT transmission for linear services, in addition to using it for non-linear services. At the moment, around one in ten households have internet-connected sets¹² but increasingly new TV sets and set-top boxes both incorporate internet connectivity and are easy to connect using built-in Wi-Fi.

6.11 Whilst the potential reach of IP services in 2020 will not match DTT, it could cater for a large number of Freeview homes. The table below considers the potential broadband speeds required and the number of households which will have the capability of receiving such services. We have sought to identify the requirements for the delivery of simultaneous services, because people often want to make use of multi-room services and/or PVR functionality (i.e. recording two channels while viewing another). In practice, some additional capacity is also likely to be required to facilitate additional uses of broadband at the same time as viewing TV.

¹² Either directly or via a set-top box

Figure 6.1: Household access to illustrative IPTV services

Service	Bit-rate Requirements in Mbits/s	Households supporting these speeds (2013)	Households in 2020E
Single SD	0.5 - 1	70%	88%
Single HD	2.5 - 3.5	59%	81%
3 SD	1.5 - 3	63%	83%
3 HD	7.5 - 10.5	35%	72%

Assumptions: By 2020, broadband take-up is 90% of UK households, and SFBB take-up as 57% of all broadband connections. We also assume that the compression technology in use is the more efficient HEVC standard.

Source: Ofcom

- 6.12 In addition, consumer take-up of internet connected devices would need to be considerably higher than it is today. We note that some forecasts suggest that penetration of connected sets could exceed 50% of DTT primary sets within the next 5 years. In addition, a compelling, well priced new hybrid product from Freeview could drive this number higher.
- 6.13 An area that will need significant attention is ensuring that it is clear to consumers what products provide what services in this increasingly complicated environment. In this context, we are encouraged by DTT stakeholders' discussions around joint marketing of Freeview Connect, which intends to provide both an agreed technical specification and a marketing banner that potentially makes it easier for consumers to understand the proposition.

Making changes to compression and transmission standards

- 6.14 If, in the longer term, HD and potentially Ultra HD become more important to consumers, then there may be a need to upgrade the compression and transmission standards for DTT to increase capacity to carry these services. For instance, if 4K takes hold on some platforms this could raise the entry bar for picture quality from SD to HD, even for free platforms.
- 6.15 As we stated in our consultation¹³ on the future of DTT in 2008, there is a virtuous circle of consumer adoption, supplier provision and technology developments in relation to new DTT technologies:

“In the long-term, the benefits of upgrading the DTT platform will be greatest if we can achieve a ‘virtuous circle’ in which more and more consumers have equipment using the new technologies, more and more services are made available in this way, and the cost of equipment with the new technologies keeps falling”.

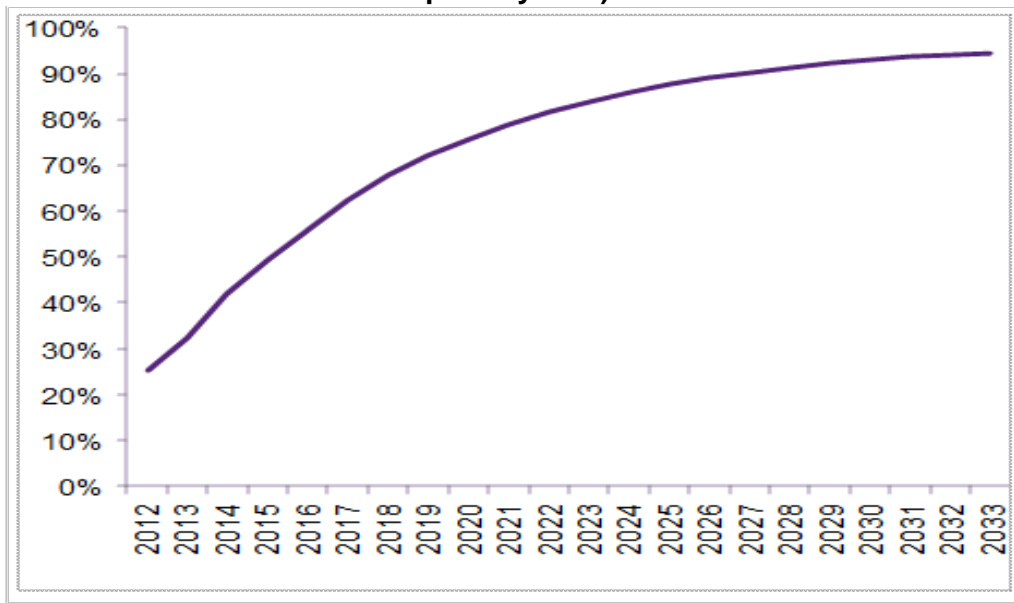
- 6.16 The challenge of upgrading consumer equipment remains the key one in considering upgrades to the DTT compression and transmission standards. We are concerned by

¹³ <http://stakeholders.ofcom.org.uk/binaries/consultations/dttfuture/summary/dttfuture.pdf>

the notion that large numbers of unwilling consumers might be expected to meet the costs of upgrading their equipment periodically to allow for these advances.

- 6.17 It is therefore incumbent on the industry to drive the virtuous circle we refer to above, if upgrades to the transmission and compression technologies are going to be possible.

Figure 6.2 Forecast take-up of MPEG4/DVB-T2 technology (% of DTT primary sets)



Source: 3 Reasons, November 2013

- 6.18 The chart above shows that, on current forecasts, only around 80% of homes¹⁴ will have upgraded equipment on their primary sets by 2022, which is the timescale on which we have based our assessment of a potential change of use of the 700 MHz band. The figure is likely to be much lower for secondary sets.
- 6.19 Some stakeholders have made the case to us that public policy interventions will be needed to require the upgrade of transmission and compression standards on DTT, and that doing so should be co-timed with any change in use of the 700MHz band. The argument put to us is that the industry alone will not be able to take the necessary steps.
- 6.20 Given present forecasts for equipment take-up, we do not see a full upgrade to MPEG4/DVB-T2 at the same time as any potential change of use in the 700MHz band as a credible option at this stage. This view is driven primarily by the scale of the costs that would be imposed on viewers who needed to upgrade their equipment. To address this, industry-led action to drive the take-up of MPEG4/DVB-T2 equipment will be critical in reducing the cost impact on consumers to a point where an upgrade might become feasible.
- 6.21 We see three key ways in which the industry can act now:

¹⁴ We note that other predictions are more optimistic, for instance Mediatique forecast 97% primary set take-up of DVB-T2 by 2022. This forecasting range helps illustrate the potential benefits of concerted industry action to encourage consumers to upgrade to MPEG4/DVB-T2 equipment.

- a) **Future proofing consumer equipment and providing clear consumer information:** The industry could also provide clear consumer information to ensure consumers understand the tradeoff between receiver costs and the ability to support new services. In particular, as the incremental cost of making all DTT receivers compatible with MPEG4/DVB-T2 decreases, it might be appropriate for all DTT receivers using the Freeview brand to be required to be compatible.
- b) **Making new products compatible with new technologies:** if new products, such as Freeview Connect are to be launched, then they should be compatible with new technologies wherever possible, in particular DVB-T2 and MPEG4.
- c) **Making services available that will drive take-up of new equipment:** the range of HD channels available to DTT viewers remains limited, with broadcasters choosing to make some of their most attractive HD content available exclusively to pay platforms. Technical measures to promote more efficient means of broadcasting are unlikely to be effective unless content is made available which exploits these to improve the viewer experience. The industry will also need to consider what role Ultra HD might play in the future.

6.22 Finally, DTT stakeholders will need to consider whether more advanced compression standards should be built into any new transmission or reception equipment in coming years. High Efficiency Video Coding (HEVC) has now been standardised and is likely to begin being incorporated into TV equipment within the next few years, driven by its likely use in other countries and the low incremental cost of its incorporation. HEVC offers significantly greater capacity than MPEG4, allowing for instance all channels on each DTT multiplex to be broadcast in HD or alternatively some channels to be broadcast in Ultra HD if that standard becomes appealing. France, Denmark and other countries are already considering the use of HEVC in the future for DTT transmission.

Figure 6.3: Capacity per DTT multiplex under different technology

	SD channels	HD channels (1080i)	Ultra HD/4K channels
MPEG2/T1	8-13 SD	1-2 HD	0 UHD
MPEG4/T2	25-40 SD	5-8 HD	1 UHD
HEVC/T2	50 – 60 SD	10-14 HD	2-3 UHD

Source: Ofcom

Industry should develop and drive the long-term view of platform evolution

- 6.23 There is a considerable risk of regulatory failure if intervention were to take place now to implement specific upgrades.
- 6.24 While the risk of regulatory failure also arose at time Ofcom intervened to ensure early arrival of HD services on DTT, we concluded at the time that the risk was low in relation to the expected benefits, in part because there was broad consensus among the relevant parties both in relation to the desirability of an upgrade in DTT

technology as well as the most effective technical solution. The same degree of consensus does not seem to be in place now, as evidenced for instance by the limited interest to date in taking up spare slots on the interim multiplexes to help drive a virtuous circle of consumer adoption.

6.25 Hence, rather than undertaking regulatory intervention to initiate changes to the DTT platform we see an essential role for industry stakeholders. Specifically, we consider that they will need to devise and agree a long-term strategy for the future evolution of the DTT platform incorporating the following:

- the role of IPTV delivery for both SD and HD linear and non-linear services, built round around an appealing and genuinely free means of accessing IPTV services;
- timing and implementation of upgrades to new transmission/compression standards including DVB-T2, MPEG4 and possibly HEVC, including how consumers are properly informed about what equipment they should purchase and when; and
- protection of consumer interests, including how an optimal balance can be achieved between consumer upgrade costs and the availability of a wide range of SD and HD services over FTV television. Requiring large numbers of consumers to upgrade to new equipment without receiving genuine and perceivable benefits – and therefore having the incentive to do so of their own accord - is likely to be contrary to consumers' interests¹⁵.

Effective coordination is critical to delivering the upgrade path

6.26 We have also considered the challenges of coordination and the potential for coordination failures to prevent a long-term upgrade strategy for DTT. While work we commissioned from Mediatique suggested that individual multiplex operators could have the commercial incentive to switch to MPEG4/DVB-T2 transmission once enough DTT viewers had adopted compatible equipment, there could be reasons why DTT stakeholders are reluctant to upgrade to more efficient transmission and compression methods, even at a point where consumer take-up of connected sets or MPEG4/DVB-T2 sets is high.

6.27 These reasons include uncertainty about the demand for newly created slots or around the risk of losing revenues from existing slots. This uncertainty could potentially create risks for a multiplex operator contemplating a move to new standards. Alternatively an operator may be reluctant to invest in encouraging consumers to move to MPEG4/DVB-T2 because they hope other multiplex operators or broadcasters will undertake the necessary investment: so-called 'free riding' behaviour.

6.28 Achieving such an upgrade therefore puts a significant premium on the governance arrangements for DTT. In the past there have been significant issues around co-ordination on the DTT platform, which have required regulatory intervention in order

¹⁵ Although digital switchover required consumers to upgrade their analogue TVs the process was eased by the fact that they consequently received a huge increase in the number of available channels

to promote consumer and citizen interests. The most notable example is the launch of HD services on DTT, which was facilitated by Ofcom¹⁶.

- 6.29 Since then, we recognise that co-ordination between DTT stakeholders has improved considerably, with bodies such as Digital UK and Freeview working more effectively at bringing together different parties on the platform and co-ordinating between them.
- 6.30 Nevertheless the task involved in developing and agreeing a co-ordinated long-term evolution path for the DTT platform - involving not simply IPTV and MPEG4 and DVB-T2 compression transmission but also potentially looking forward to HEVC services - is considerable. While we welcome the more strategic approach that stakeholders have adopted in recent years, we do not rule out the need for more to be done to ensure that decisions are taken in the long-term interests of the platform.
- 6.31 It will therefore be necessary to continue to review the governance arrangements for DTT, to ensure that they provide an effective framework for strategic decisions about the long-term future of the DTT platform.

¹⁶ <http://stakeholders.ofcom.org.uk/binaries/consultations/dttfuture/summary/dttfuture.pdf>

Section 7

Next steps

- 7.1 The issues in this discussion document play directly to Ofcom's statutory responsibilities, including our duties towards the DTT platform, in relation to ensuring a wide range of TV services and ensuring optimal use of the spectrum.
- 7.2 Nevertheless, we recognise that delivering a successful long-term strategy for FTV television is a shared objective for ourselves, broadcasters and the Government. Many of the challenges set out in this document will ultimately require a coordinated response from a wide set of stakeholders, including industry and the Government. We are therefore presenting this analysis to inform and contribute to this wider public debate, rather than as a definitive view of how FTV television should be delivered in the future.
- 7.3 We are keen to engage directly with stakeholders on the issues raised in this document. Critically, this includes considering further where regulatory action or changes to the current regulatory framework may be required to facilitate industry's development of a long-term strategy.
- 7.4 One relevant area that we recognise we are likely to need to consider further is the expiry of current DTT multiplex licences, in either 2022 or 2026. It may conceivably be the case that licence expiry, and the consequent lack of certainty about the issuing of new licences, could deter development of a long-term strategy for DTT in the years ahead. We recognise that as the end of the licence period moves closer, potential uncertainty about future licence arrangements poses an increased risk of a deterrent effect on investment.
- 7.5 The Government has already committed to legislation to allow greater flexibility about the expiry dates of current multiplex licences:
- "We will enable more strategic decisions to be taken about the spectrum currently used by terrestrial television by allowing Ofcom, with the Secretary of State's consent, to align the end dates of TV multiplex operator and Public Service Broadcast licences between 2024 and 2026, and ensure that they remain aligned in the future."¹⁷*
- 7.6 In order to minimise any investment uncertainty, Ofcom will explore with Government and industry what steps can be taken to ensure that future licence expiry does not hold back development of the DTT platform in the years ahead. However, this can only be done in the context of a clear, coordinated articulation from industry for the long-term strategy for DTT.

Potential change in use of the 700MHz band

- 7.7 We expect to take a final decision on the potential release of the 700MHz spectrum band by late 2014 or early 2015. This decision will determine whether the interim multiplexes are required to close and if so on what timeline.

¹⁷ *Content, Connectivity and Consumers*. DCMS, July 2013.

International debates

- 7.8 This work also plays into a developing international debate around the future of the 470-694MHz spectrum band. Several international discussions on the future of this band are taking place, especially within Europe. This band, or parts of it, could also be considered for a “co-primary” allocation to mobile services at the 2015 World Radio Conference (WRC-15). Ofcom is already playing an active role in these discussions, and will continue to do so in the run up to WRC-15 and beyond.
- 7.9 The detail of these debates is outside of the scope of this document. However, we note that long term level of demand for additional mobile spectrum is still very uncertain and that the lower part of this band may be of limited attractiveness, including due to aerial handset constraints, which require further examination. In addition, we consider that the on-going importance of DTT and barriers associated to IPTV availability and take-up could make a DTT switch-off unlikely until at least 2030. This is consistent with the view we set out in our UHF Strategy Statement¹⁸, which forms the basis of our position for international engagement.
- 7.10 We will continue to ensure that the UK’s contribution to such international debates clearly recognises the importance of DTT.

¹⁸ <http://stakeholders.ofcom.org.uk/consultations/uhf-strategy/statement>

Glossary

ADSL (Asymmetric Digital Subscriber Line). A technology used for sending data over a conventional copper telephone line. It is used in current generation internet services with download speeds up to 24Mbit/s

ARPU (Average revenue per user). A metric often used by companies that divides total revenues in a given period time by the total customers during that period.

Broadband. A service or connection generally defined as being 'always on' and providing a bandwidth greater than narrowband.

Catch-up TV. Usually refers to a services that allow consumers to watch or listen to content on a non-linear basis after the initial broadcast.

Communications Act. Communications Act 2003, which came into force in July 2003.

'Connected' TV. A TV that is broadband-enabled to allow viewers to access internet content.

Digital switchover. The process of switching over the analogue television or radio broadcasting system to digital.

DTT (Digital terrestrial television). The transmission technology that carries the Freeview service.

DVB (Digital Video Broadcasting). A set of internationally accepted open standards for digital broadcasting, including standards for distribution by satellite, cable, radio and hand-held devices (the latter known as DVB-H).

DVB-T2. The latest digital terrestrial transmission technology developed by DVB. The technology is being used to facilitate the introduction of HDTV on DTT in the UK. DVB-S2 (satellite) and DVB-C2 (cable) are also available.

eMBMS (Evolved Multimedia Broadcast Multicast Service). The multicast standard for Long Term Evolution (LTE), that allows multimedia content to be sent once and received by many end users.

Free to view. Broadcast content that people can view without having to pay a subscription.

HDTV. High-definition television. A technology that provides viewers with better quality, high-resolution pictures.

HEVC (High Efficiency Video Coding). A new, more efficient, video compression standard.

IP (Internet Protocol). The packet data protocol used for routing and carrying messages across the internet and similar networks.

IPTV (Internet Protocol television). The term used for television and/or video signals that are delivered to subscribers or viewers using internet protocol (IP), the technology that is also used to access the internet. Typically used in the context of streamed linear and on-demand content, but also sometimes for downloaded video clips.

LTE (Long Term Evolution). Part of the development of 4G mobile systems that started with 2G and 3G networks. Aims to achieve an upgraded version of 3G services having up to 100 Mbps downlink speeds and 50 Mbps uplink speeds.

Mbit/s (Mega (million) bits per second). A measure of the speed of transfer of digital information.

MHz (Megahertz). A unit of frequency comprising one million cycles per second

MPEG (Moving Picture Experts Group). A set of international standards for compression and transmission of digital audio-visual content. Most digital television services in the UK use MPEG2, but MPEG4 offers greater efficiency and is likely to be used for new services including TV over DSL and high-definition TV.

Multicast. A mechanism for reducing network traffic by delivering a single TV channel simultaneously to multiple viewers.

Mux or Multiplex. A device that sends multiple signals or streams of information on a carrier at the same time in the form of a single, complex signal. The separate signals are then recovered at the receiving end.

Network neutrality. A way of processing data which does not differentiate between different bits of data when it moves through the network, so that all traffic (e.g. voice calls, web browsing, gaming etc) is treated equally.

Non-linear. Content that is delivered 'on demand' as opposed to linear, broadcast content.

'Over-the-top' (OTT) video. Refers to audio-visual content delivered on the 'open' internet rather than over a managed IPTV architecture.

Pay TV. Also known as 'subscription television'. Television broadcasts that the viewer pays to receive. UK Pay TV providers include BSkyB, Virgin Media, BT TV and Talk Talk TV.

PSB. Public service broadcasting, or public service broadcaster. The Communications Act in defines the PSBs as including the BBC, ITV1 (including GMTV), Channel 4, Five and S4C.

PVR. Personal video recorder (also known as digital video recorder' and 'digital television recorder). A digital TV set-top box including a hard disk drive which allows the user to record, pause and rewind live TV.

Share. Proportion of total TV viewing to a particular channel over a specified time, expressed as a percentage of total hours of viewing.

Smart TV. A standalone television set with inbuilt internet functionality

Superfast broadband. Sometimes known as next-generation broadband, super-fast broadband delivers headline download speeds of at least 30Mbit/s.

UHD (Ultra HD). A further iteration of HD TV to provide better quality TV pictures, and includes **4K** (3840 pixels by 2160 pixels) and **8K** (7680 pixels by 4320 pixels) picture sizes.

UHF (Ultra High Frequency). The part of the spectrum between 300 MHz and 1 GHz.

VOD (Video-on-demand). A service or technology that enables TV viewers to watch programmes or films whenever they choose to, not restricted by a linear schedule.