

Section 9

The continuing evolution of television

- 9.1 There have been no significant changes in the coverage of traditional broadcast terrestrial, satellite and cable networks over the past year. However, the ways in which TV is consumed and delivered continues to evolve, in particular TV and video delivery over broadband networks. In this section we set out three key themes:
- 9.1.1 **Linear TV consumption remains strong:** The way in which we watch TV is continuing to evolve, with more viewing over the internet, but linear broadcast TV remains overwhelmingly most important way of watching TV.
 - 9.1.2 **TV and video delivery is placing increased capacity demands on fixed and mobile broadband networks:** Growth in internet-delivered TV is having major implications for providers of fixed and mobile communications infrastructure. Video carried over fixed and mobile networks is growing rapidly, and networks need to invest in providing more capacity for it.
 - 9.1.3 **More hybrid TV platforms are becoming available:** Traditional broadcast TV platforms are becoming more integrated with the internet. In particular, pay-TV providers are connecting more of their customers to internet-delivered TV, and the free-to-air Freeview platform has launched hybrid Freeview Play services.

Viewers are able to view TV from a growing range of sources

- 9.2 Consumers in the UK receive digital television services from a number of providers:
- 9.2.1 **Satellite:** TV services over satellite are available through Sky's pay-TV service or through Freesat, which is available for a one-off digital receiver cost.
 - 9.2.2 **Cable:** Virgin Media makes TV available over its cable network and has set the target⁸³ to increase the coverage of its cable network. Once implemented this is expected to increase cable TV coverage from 45% to around 65% of UK premises.
 - 9.2.3 **Freeview:** The digital terrestrial TV (DTT) service provides access to a wide range of free-to-air channels.
 - 9.2.4 **IPTV:** A number of different providers including Now TV, BT and TalkTalk deliver linear broadband TV services. On-demand content is available to anyone connected to the internet, from a wide variety of providers.
- 9.3 Last year⁸⁴ we set out the coverage levels of these services. Coverage of satellite and cable services is largely unchanged over the past 12 months. There have, however, been some modest changes to coverage for the temporary DTT

⁸³ <http://about.virginmedia.com/press-release/9467/virgin-media-and-liberty-global-announce-largest-investment-in-uks-internet-infrastructure-for-more-than-a-decade>

⁸⁴ <http://stakeholders.ofcom.org.uk/binaries/research/infrastructure/2014/infrastructure-14.pdf>

multiplexes that Ofcom has licensed (COM7 and COM8 in the table below) and these are now available to around three-quarters of UK households.

Figure 42: Coverage levels of DTT services

Multiplex	Standards	Bit rates (Mbit/s)	Coverage
PSB1	MPEG2/DVB-T1	24	99%
PSB2	MPEG2/DVB-T1	24	99%
PSB3	MPEG4/DVB-T2	40	99%
COM4	MPEG2/DVB-T1	27	~90%
COM5	MPEG2/DVB-T1	27	~90%
COM6	MPEG2/DVB-T1	27	~90%
COM7	MPEG4/DVB-T2	40	~76%
COM8	MPEG4/DVB-T2	40	~76%

Source: Ofcom, UK Planning Model

Notes: 1) The coverage figures shown are the percentage of UK households predicted by the UK Planning Model to have coverage. 2) The standards shown refer to the compression and transmission standards used by the different DTT multiplexes. The newer MPEG4 and DVB-T2 standards allow multiplexes to accommodate more channels than the older MPEG2/DVB-T1 standards. The difference in capacity can be seen in the 'bit rates' column.

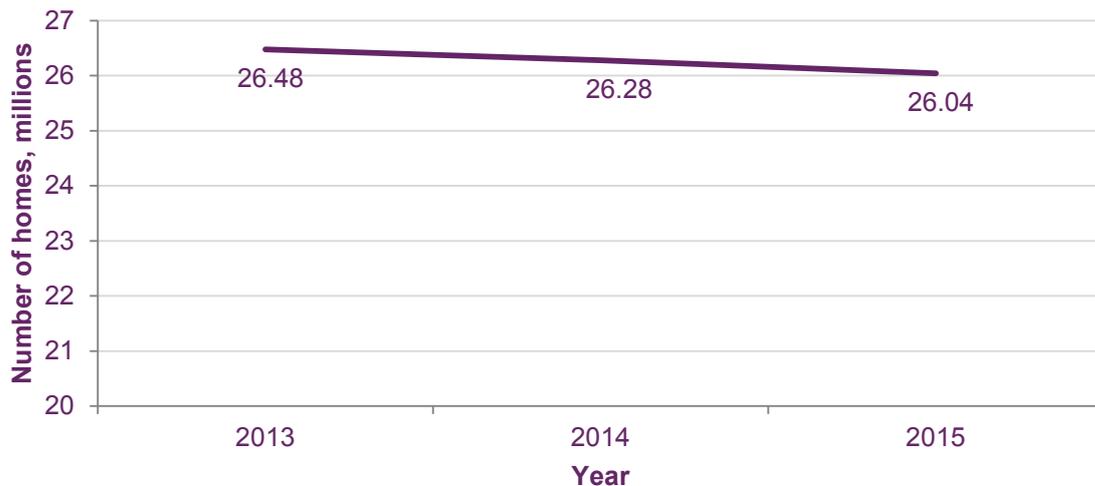
9.4 In 2014 we reported that although we had licensed two temporary DTT multiplexes, only one of them had launched. During 2015, the roll-out of the second of these temporary multiplexes (COM8 in the table above) has been completed, and new HD services (QVC+1 HD and QVC Beauty HD) have been launched on it, although capacity is still available on this multiplex.

The way in which consumers watch TV is evolving

9.5 The growing use of new broadcast technologies is changing the way in which consumers watch TV. More content is being viewed over the internet than ever before, but most viewing continues to be to linear broadcast TV. More viewers have sets capable of viewing high-definition (HD) content, although actual viewing of HD has not grown in proportion to the capability to view it.

The number of TV homes continues to fall

9.6 In last year's *Infrastructure Report* we noted that the number of homes with at least one TV was slowly declining. This trend has continued, as seen in Figure 43 below.

Figure 43: The number of homes estimated to have at least one TV continues to fall

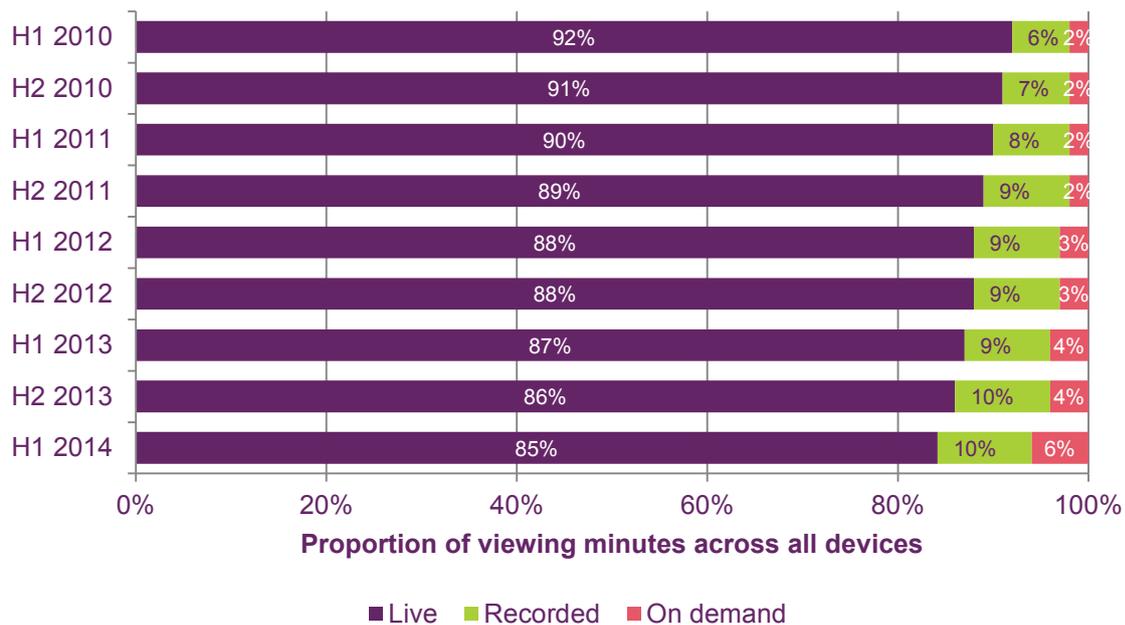
Source: BARB

- 9.7 In contrast, the number homes with no conventional TV but with a broadband connection has risen, trebling between 2009 and 2014. It is possible that many of these households are accessing TV using devices such as PCs, tablets and mobile devices. BARB estimates that there are 1.1 million homes with broadband but without a TV set, representing 4.3% of all households.
- 9.8 Younger households are less likely to have a TV set. However, as the total number of these households is growing slowly, and many younger viewers may acquire a TV set as they grow older, it is likely that conventional TV platforms, and their underlying infrastructure, will continue to be important to consumers for many years to come.

Linear TV viewing is falling, but gradually

- 9.9 The overwhelming majority of TV viewing (85%) continues to be to linear TV, i.e. watching programmes at the time of broadcast, as opposed to recording them to watch later or viewing them on demand. However, the take-up of on-demand and online viewing is continuing to grow (see Figure 44).
- 9.10 Time-shift viewing is more popular among younger age groups, and some genres of programme are time-shifted much more than average; for example, over 25% of drama viewing is time-shifted.

Figure 44: Viewing of recorded and video-on-demand content is increasing

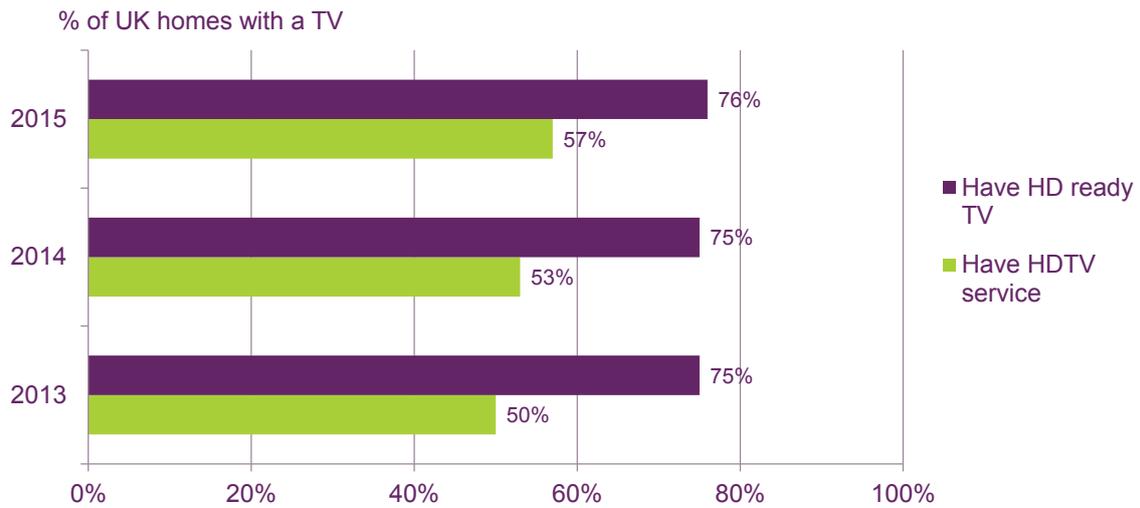


Source: BARB

More consumers are able to receive HD services, but viewing of HD channels fluctuates

9.11 Around 57% of all TV households can access HD services, although this figure is lower (41%) in DTT-only households. The ability to receive HD services in DTT households is likely to grow in future, as more consumers replace their existing SD sets with HD-compatible TV sets. The decision, by Freeview, that from 2017 onwards only HD sets will be able to carry the Freeview brand (see Figure 45) is likely to mean that in the near future all new DTT sets will be capable of receiving HD.

Figure 45: Take-up of HD services is increasing



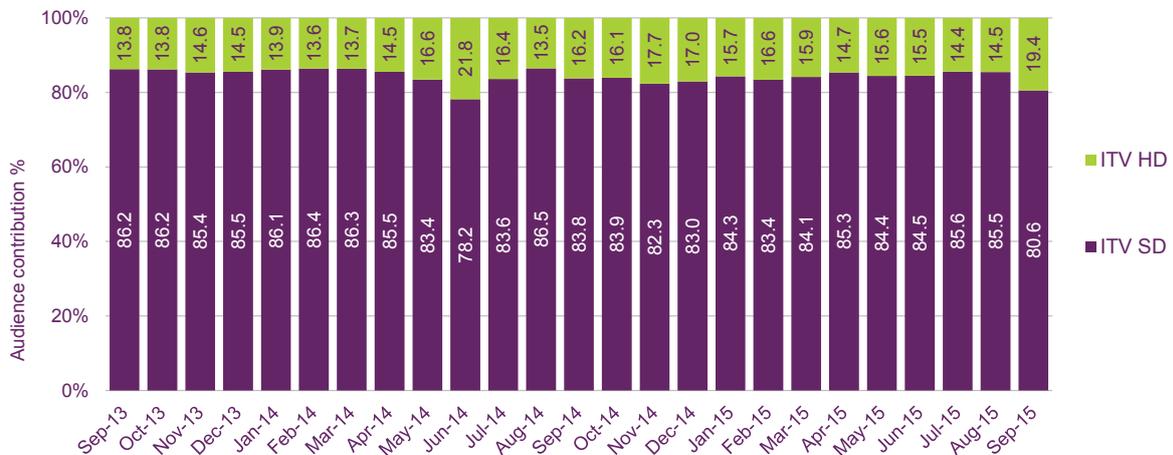
Source: Ofcom Technology Tracker, Q1 2013-2015

Notes: proportion with main TV that is HDTV set or HD ready and proportion who actually watch TV channels and programmes that are broadcast in high definition

9.12 While the ability to receive HD services has grown, the proportion of viewers watching HD programmes varies. One explanation for this, on some platforms, might be that HD services are more difficult to select than their SD equivalents using a remote control or EPG; for example, on the DTT platform the BBC One SD service can be selected using button 1 on the remote control, while three digits ‘101’ need to be entered to select the HD service. On the DTT platform, regional services are available only on the SD channel.

9.13 We have some evidence that viewers are switching to HD versions of channels for some types of content. The chart below shows viewing of the ITV HD channel as a proportion of total ITV viewing share, in homes that have access to HD. It shows that in these homes, significantly more viewers choose to watch ITV in standard definition rather than ITV HD, most of the time. The data also show, however, that HD viewing (of ITV at least) increases during major sports tournaments such as the football World Cup in 2014 and the rugby World Cup in 2015.

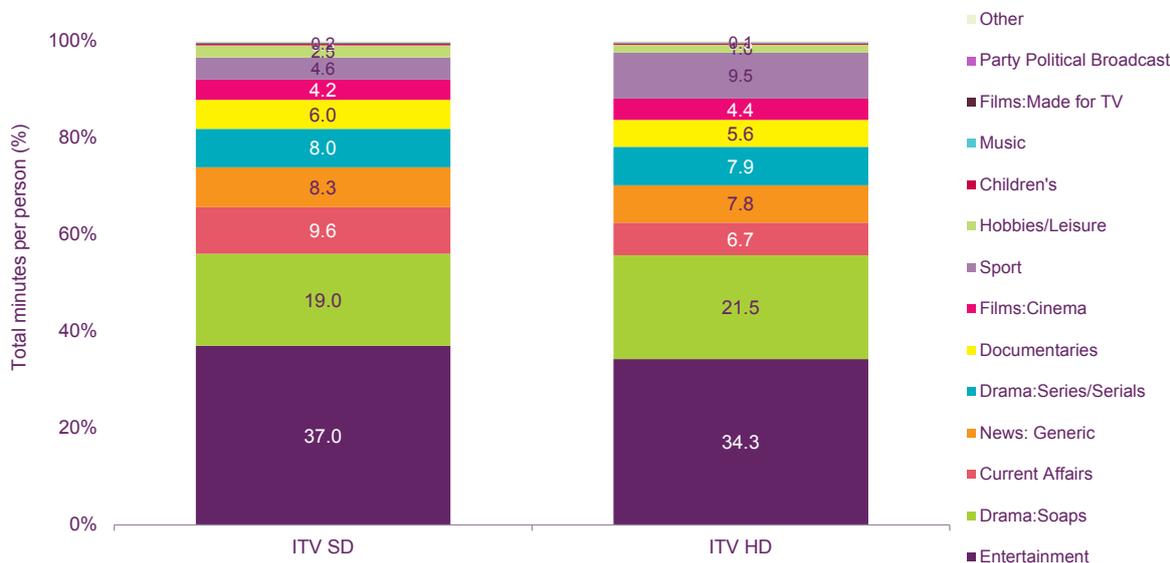
Figure 46: The proportion of viewers watching HD programming varies



Source: BARB/Infosys+. Individuals 4+ with HD, ITV (SD+HD), Network

9.14 In order to further examine how viewers choose to watch HD, we looked at whether there is higher HD viewing of certain types (or genres) or programmes. We found that viewing of ITV HD is proportionately higher for sport, films and soaps, but lower for other genres, as seen in Figure 47.

Figure 47: Viewers prefer to watch certain genres in HD



Source: BARB/Infosys+. Individuals 4+ with HD, Network, (4+ regions), Jan-Sep 2015. Note: proportion of viewing based on total minutes viewed per person to each genre. Based on standard BARB genre definitions

9.15 The above evidence suggests that consumers value HD channels for certain types of content, and make an active decision when to watch HD and when to watch SD services. While HD viewing is likely to continue to grow as more consumers own HD sets, it may not do so uniformly across all types of programmes.

A number of trends are driving up IPTV viewing

9.16 As we set out in Section 4, data use over fixed networks is continuing to grow by over 40% a year, driven in particular by video. A combination of distinct trends suggest that the recent strong growth in video use over fixed networks is likely to continue:

- 9.16.1 **Take-up of connected devices and superfast broadband.** Most consumers have a TV connected to the internet via a smart TV, set-top box, games console or device (such as Chromecast, Apple TV etc.) – sometimes multiple devices. And as we set out in Section 4, the vast majority of UK households now have broadband connections capable of supporting steamed video.
- 9.16.2 **More use of video on demand.** Our consumer research has found that viewing of video services such as YouTube and Vimeo is continuing to grow, and that many consumers see them as an important source of information, as well as entertainment; 47% of internet users said that they had used YouTube as an information source.
- 9.16.3 **Growing take-up of linear IPTV services.** Linear internet TV (IPTV) services, such as BT TV and Now TV, are continuing to add customers, competing with existing pay-TV platforms such as Sky and Virgin Media, particularly at the low-cost end of the market.

- 9.16.4 **Higher use of subscriber video on demand (SVoD).** More households are subscribing to video-on-demand services such as Netflix, Now TV and Amazon Prime (see below). However, subscription video-on-demand services are, on the whole, complementing conventional TV rather than replacing it. Figures from BARB indicate that Netflix subscriptions are above average in pay-TV homes and are below average in homes without TVs, as well as in free-to-air TV homes (Freeview and Freesat).
- 9.16.5 **More online catch-up viewing.** As more catch-up viewing is done online, the demands for internet bandwidth and capacity are likely to grow further. In part, online catch-up viewing is driven by higher take-up of smart TVs and connected set-top boxes. But on-line catch-up viewing is now increasingly substituting for DVR-recorded programming when viewers want to watch programmes they have missed. BARB reports that in December 2014 Sky On Demand accounted for 11% of all time-shifted viewing on Sky, up from just over 6% in July 2013.
- 9.16.6 **Improved ease of use.** Over the past decade, touchscreens and intuitive user interfaces have made it easier to use smartphones and tablets, increasing their popularity. IPTV services, on the other hand, have been relatively difficult to use. However, recent improvements, such as more intelligent devices, clearer broadcaster apps and voice-controlled interfaces, are all making it easier for viewers to watch on-demand TV.
- 9.17 Similarly, as more consumers acquire smartphones and move onto faster 4G mobile services, it is likely that video viewing on mobile phones will carry on increasing strongly, with significant implications for the mobile infrastructure.

Implications of changing viewer behaviour for broadband infrastructure

- 9.18 As discussed in Section 4, the vast majority (98%) of broadband connections are, in principle, now capable of providing IPTV in at least standard definition (SD), since they can receive a speed of above 2Mbit/s. However, as also set out in Section 4, the quality of these services is much more likely to be rated as 'good' at higher connection speeds.
- 9.19 A large proportion of data traffic on fixed and mobile networks is made up of video, with providers having to improve network capacity to ensure that consumers receive a high quality experience. The extent to which more capacity will continue to be needed is difficult to forecast with any certainty. For example, while the picture quality of online video is improving, the use of newer, more efficient, compression standards is also helping to lower the bandwidth requirements for online video. In addition, the wider use of multicast technology and content delivery networks is likely to reduce the demand for capacity in some part of the broadband delivery chain.
- 9.20 Currently, a broadband connection speed of at least 2 to 3Mbit/s is needed to deliver an SD video stream, of 6 to 8Mbit/s to deliver an HD stream, and 20 to 25Mbit/s for an ultra-HD stream (also known as 4K). In practice, higher speeds than these are likely to be needed to provide access to other broadband services in the same household the same time, and to account for other reductions in connection speed caused by congestion in the broadband delivery chain.
- 9.21 The new and more efficient HEVC (high efficiency video coding) compression standard is now being used, including for new ultra-HD services from BT, Netflix,

Amazon Prime, and YouTube. If more widely implemented for IPTV, HEVC standards may not only help to provide capacity for higher-resolution broadcast TV, but may also cut the connection speeds needed to deliver IPTV. For example, an HD video stream might, using HEVC, be delivered with a connection speed in the range of 3 to 4Mbit/s; and an ultra-HD stream using less than 10Mbit/s.

Implications of changing viewer behaviour for broadcast infrastructure

9.22 In Ofcom’s *The Future of Free-to-View* discussion document⁸⁵, published in 2014, we noted the consumer trends of improved picture quality, more internet connectivity and greater viewer choice (illustrated in Figure 48) and indicated that TV platforms would have to continue evolving in order to meet consumer needs.

Figure 48: Trends in TV consumption

	1990s	2000s	2010s	2020s
Consumer trends	Explosion of multichannel television	Consumer control and time-shifting: DVRs, +1 channels and online catch-up	Key trends for the next decade	
			Drive for picture quality	Compression technology driving UHD and HD potentially becoming the norm
			Internet connectivity	Personalisation, search / recommendation and new interactive IP services
			Continued fragmentation	New battleground of “pay-lite”, more non-linear viewing, evolution of online services (e.g. Netflix), new market entrants

9.23 In terms of infrastructure, we noted that TV platforms would have to address these viewer challenges, by:

- providing more channels and services over IP through hybrid/DTT products, such as Freeview Play and YouView ; and
- upgrading broadcast compression and transmission standards.

9.24 TV platforms are making these improvements. For example, Freeview has launched its Freeview Play service, which offers consumers easier-to-use IPTV services. It has also announced that the Freeview label will be available only for HD products from the end of 2016. Sky have also launched their Sky Q platform which similarly integrates broadcast and internet TV services.

9.25 Other TV platforms have, over the past year, continued to connect their subscribers’ TV set-top boxes to the internet. Pay-TV platforms have also announced improvements in picture quality, with Sky and BT now offering ultra-HD services. As the evidence of viewing HD indicates (Figure 46), it is likely that the demand for higher picture quality will vary between consumers.

9.26 An improved selection of HD channels on DTT is likely to encourage viewers to adopt Freeview HD. In the short term, new capacity for HD channels has come from the launch of two temporary DTT multiplexes using the 600MHz spectrum band that was

⁸⁵ <http://stakeholders.ofcom.org.uk/binaries/consultations/700MHz/discussion/ftv.pdf>

cleared as a result of digital switchover⁸⁶. These temporary multiplexes, available to around 76% of UK viewers, use more efficient technology⁸⁷ and their transmissions can be received by households with Freeview HD equipment.

- 9.27 In turn, these newer technologies allow more channel capacity on the multiplex, thereby providing a range of SD and HD channels that were not previously available over DTT. The new SD and HD channels on the temporary DTT multiplexes, provided they are attractive to viewers, should encourage consumers to adopt Freeview HD sets, recorders and devices.
- 9.28 The new Freeview Play receiver standard includes support for MPEG 4 and HEVC compression. Although there is no plan to broadcast a broader range of services using HEVC on digital terrestrial TV in the UK, the standard's support for HEVC services will help future-proof the platform and could be used to provide additional DTT capacity in future. The support for MPEG 4 could be particularly important when the existing temporary multiplexes are eventually turned off, to accommodate new mobile broadband services⁸⁸.

Broadcasters will have to continue adapting to changing viewer needs

- 9.29 Although viewer behaviour is changing, it is important to remember that this change is taking place slowly, with the majority of viewing still to linear broadcast TV. There is also wide variation in people's behaviour. Some continue to watch many hours of linear broadcast TV per week; others, usually younger, do not even have a TV set, and watch everything online. The future capacity demands on traditional TV and broadband infrastructure is likely to depend on the extent to which the on-demand and online viewing habits of a currently small proportion of the population are adopted more widely over time.

⁸⁶ In 2012, analogue terrestrial TV services in the UK were switched off and replaced by digital services, which offer better picture quality. Broadcasting digital TV services is also more efficient, which means it is possible to transmit a greater number of channels while using less radio spectrum than was previously required. This released spectrum for new uses, including 4G mobile services.

⁸⁷ The use of DVB-T2 transmission technology and the MPEG4 compression standard means that more channels can be broadcast within the same amount of radio spectrum.

⁸⁸ In November 2014, we published a statement setting out our decision to make the 700MHz band available for mobile broadband. Our objective is to make the band available for mobile by the start of 2022, and sooner if possible.