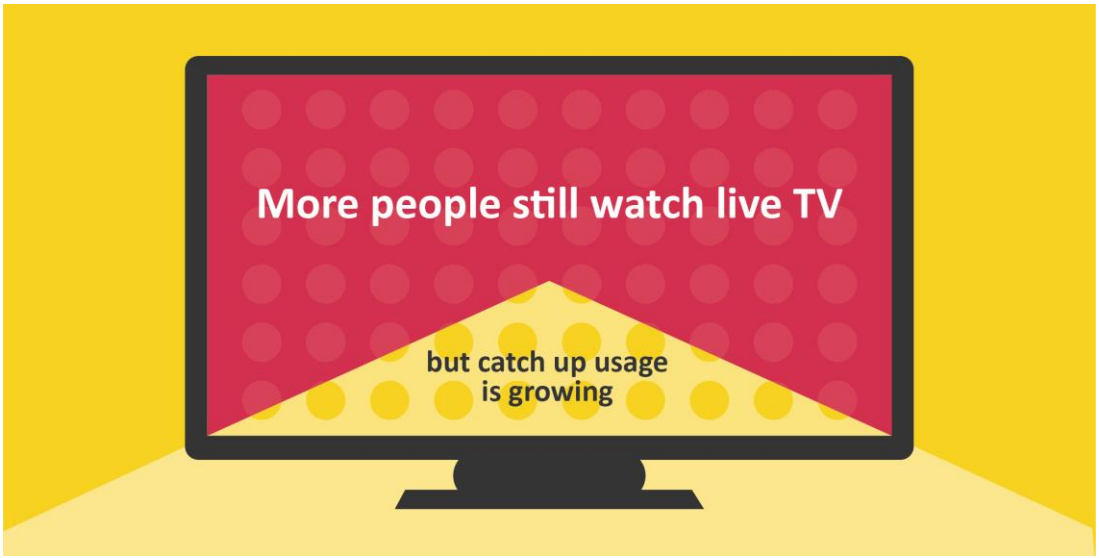
9. The continuing evolution of television

9.1 Television distribution and consumption continues to evolve. Broadcast television services are increasingly being complemented by broadband TV services. Many of these can now be accessed on the same consumer equipment, providing easy access to wider range of broadcast and on-demand TV content. There has also been a continued move towards higher resolution formats, with an increased range of both HD (High Definition) and UHD (Ultra High Definition) content becoming available on TV delivery platforms.



9.2 In this section we set out three key themes:

a) **The live consumption of broadcast TV channels remains popular with viewers:** Estimates[110] show that viewing live TV (i.e. broadcast TV content watched at the time of transmission) still represents nearly 80% of viewing.

b) **There continues to be a significant increase in both the number and sophistication of hybrid broadcast/broadband TV platforms:** Hybrid TV platforms are continuing to improve in functionality and uptake, merging broadcast and online content into one consumer experience.

c) **More Ultra-High Definition (UHD/4K) content is becoming available:** Just over 40% of all TVs sold recently support UHD.[111] UHD Blu-ray discs are available, and satellite and online distribution of UHD content continues to grow.

d) However, whilst 63% of consumers can receive HD services, only 18% choose to watch in HD.

[110] There is currently no industry standard measure of viewing across all devices and we use a variety of sources, including consultancy estimates, to assess this.
[111] The majority of UHD receivers also support HDR – High Dynamic Range – which gives TV pictures greater contrast and more vibrant colours.

Consumers are able to view content from a wide range of sources

9.3 Consumers in the UK receive digital television from a number of providers:

a) **Satellite:** TV services delivered by satellite are available through platforms such as Sky's pay-TV service or Freesat, which is available for a one-off digital receiver cost, or also at no cost through Sky's UK viewing card (marketed as Freesat from Sky).

b) **Cable:** Virgin Media makes TV available over its cable network and passes 45% of UK homes. It has a target to increase the coverage of its cable network by 4 million homes and, once implemented, this is expected to increase cable TV coverage to over 60% of UK premises. There is also a small cable network on the Isle of Wight operated by WightFibre.

c) **Digital Terrestrial Television:** A wide range of free-to-air channels is available via an aerial, accessible through Freeview by TVs and hybrid (broadcast plus online) boxes such as Freeview Play, Now TV and YouView.

d) **IPTV:** A number of different providers, including BT, Now TV, TalkTalk and Plusnet deliver linear broadband TV services. Synapse TV and Connect TV offer a range of IPTV channels linked from slots on the Freeview electronic programme guide (EPG). Channel related catch-up content is also delivered online (supplementing DVR use) and on-demand non-catch-up content is available from a wide variety of providers including Netflix, Amazon Prime, and YouTube. Availability of broadband coverage to support IPTV is discussed in 9.16.

9.4 The coverage of the different national, commercial, regional and local DTT multiplexes is shown in Figure 42 and Figure 43 below as a percentage of households. HD services (using MPEG4 and DVB-T2) are carried by PSB3, COM7 and COM8. We also present the coverage of satellite and cable in Figure 44.

Figure 42: Coverage of DTT national, interim and local services

Multiplex	Standards	Bit rates (Mbit/s)	Coverage (Households)
PSB1 (BBC A)	MPEG2/DVB-T/64QAM	24	99%
PSB2 (D3&4)	MPEG2/DVB-T/64QAM	24	99%
PSB3 (BBC B)	MPEG4/DVB-T2/256QAM	40	99%
COM4 (SDN)	MPEG2/DVB-T/64QAM	27	~90%
COM5 (Arqiva A)	MPEG2/DVB-T/64QAM	27	~90%
COM6 (Arqiva B)	MPEG2/DVB-T/64QAM	27	~90%
COM7	MPEG4/DVB-T2/256QAM	40	~76%
COM8	MPEG4/DVB-T2/256QAM	40	~76%
LTVMux	MPEG2/DVB-T/QPSK	9	~54%[112]

Source: Ofcom

Figure 43: Coverage of DTT regional services

Multiplex	Standards	Bit rates (Mbit/s)	Coverage (Households)
NIMux	MPEG2/DVB-T2/QPSK	9.8	~71%[113]
GIMux (Manchester)	MPEG2/DVB-T/16QAM	18.1	~55%[114]

Source: Ofcom

Figure 44: UK coverage of Digital satellite TV and Virgin Media cable broadband

Platform	Availability	Notes
Digital satellite TV	98%	Relates only to the ability to achieve a necessary line of sight path to the satellite and does not include other factors that can affect coverage including: access in multi-dwelling units where it is not feasible to install a dedicated household satellite dish and there is no internal wired distribution system for satellite, and the need for planning permission in some locations.
Virgin Media cable broadband	45%	Proportion of premises able to receive Virgin Media cable broadband services.

Source: Ofcom analysis of operator data and from operators

[112] Local coverage from 21 currently on-air stations, of 34 granted licences
[113] Expressed as a percentage of households in Northern Ireland
[114] Expressed as a percentage of households in Greater Manchester

The ways in which consumers watch content are evolving

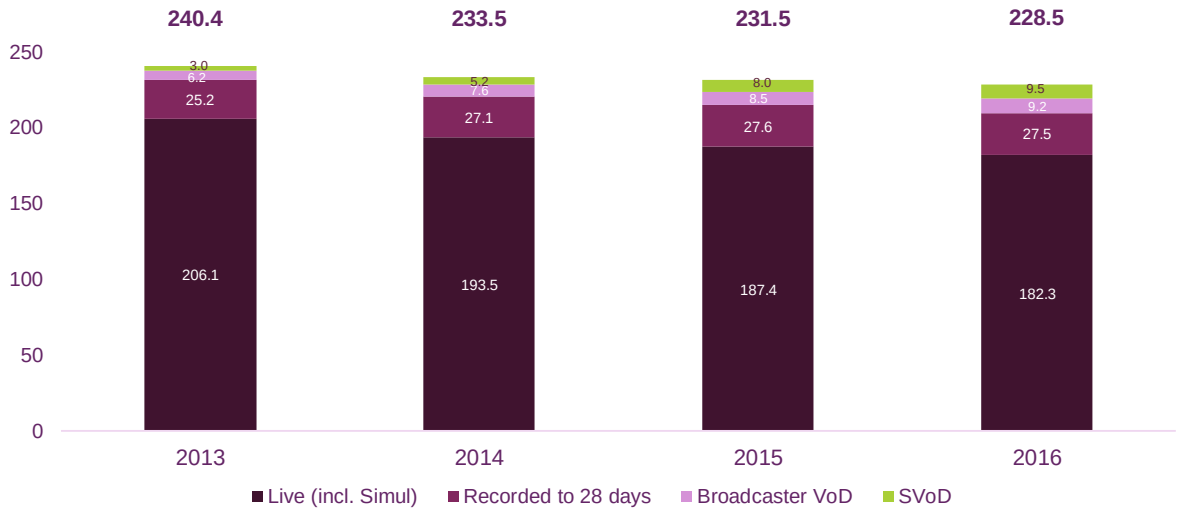
9.5 As shown in Figure 45, estimates show that live TV, at 182.3 minutes per day or around 80% of all consumption, remains by far the most popular way of viewing TV, but continues to decline slowly each year.

9.6 However, there has been an increase in the use of TV channel related catch-up, archival and on-demand services, through both digital video recorders (DVRs) and online sources such as the BBC iPlayer, All 4 and Sky on-demand services.

9.7 Subscription video on demand (SVoD) viewing, such as Netflix and Amazon Prime, continues to increase, albeit from a low base.

9.8 Overall, the decline in the amount of time spent watching long-form video content has continued from previous years. The UK Communications Market Report 2017[115] shows that this decline is commensurate with a rise in the use of a variety of alternative media services including social media, games and short-form video content.

Figure 45: Average daily viewing minutes across all devices for live TV, catch-up DVR, broadcaster VoD and SVoD.



Source: 3 Reasons estimates (including BARB data). 8-28 day time-shifted viewing was introduced by BARB in July 2013. Base: All devices, legal, long-form professional AV content, Live includes simulcast. Excludes physical consumption (e.g. DVDs), short-form, pirated and adult content. Note: there was a methodology change to the 3 Reasons viewing estimates in 2016. All years of data reflect this change. Data is therefore not comparable to previously published data in the CNR 2016.

Broadcaster VoD = all on-demand from Broadcasters (e.g. BBC iPlayer, ITV Hub, All 4, Demand 5, Sky On-Demand, UKTV Play etc) including both catch-up and archive delivered across all platforms excluding the SVOD platforms as specified below.

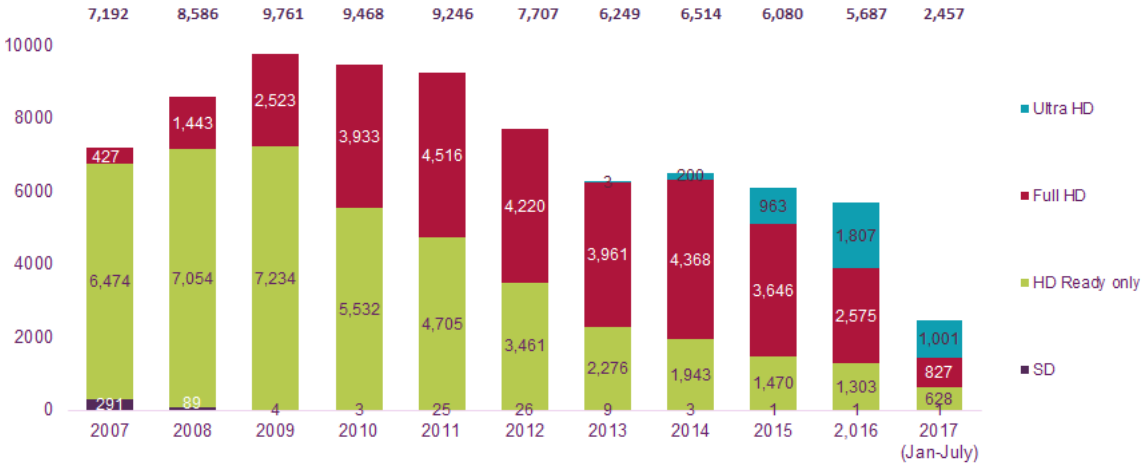
[115] See pages 89 and 90 of the UK Communications Market Report 2017.
https://www.ofcom.org.uk/__data/assets/pdf_file/0017/105074/cmr-2017-uk.pdf

SVoD = on-demand from Netflix, Amazon Prime Instant Video, non-broadcast VoD from Now TV (PSB VoD from NowTV is attributed back to PSB VoD) and other SVoD providers

Most consumers are able to receive HD services, and UHD/4K services have increased the range of available content

9.9 Sales of HD compatible sets, including UHD sets, represent nearly 100% of new set sales with UHD compatible sets at just over 40%. Sales of Standard Definition (SD) sets are now almost insignificant and, as of this year, only HD or UHD sets are permitted to carry the Freeview brand logo.

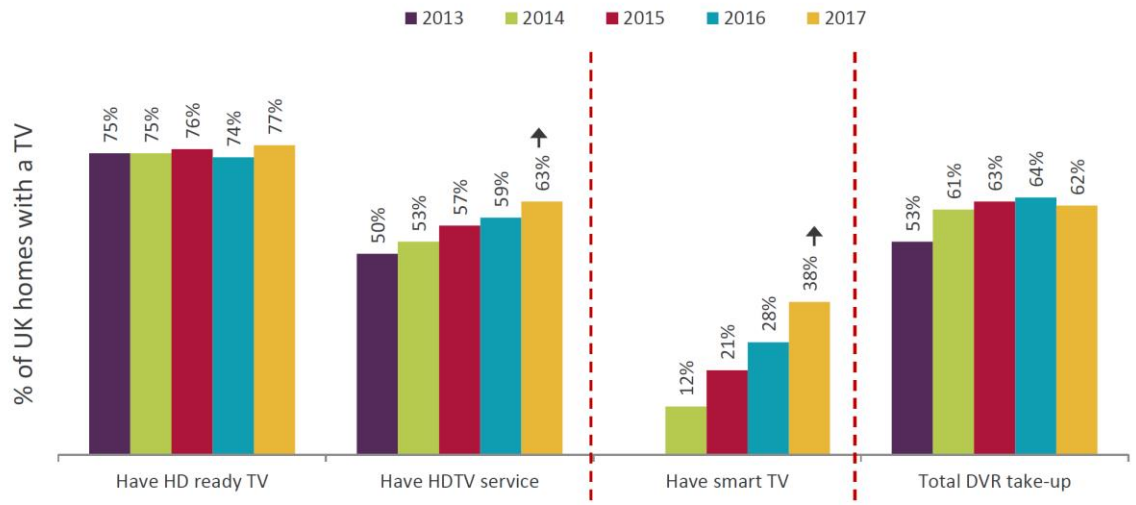
Figure 46: Sales volume share of receivers, by technology (000's)



Source: GFK - sales volumes of SD, HD and HD ready, full HD and UHD receivers.

9.10 Figure 47 shows that 63% of all TV households are now accessing HD services. This figure is likely to grow as more consumers replace existing SD sets with HD and UHD capable sets.

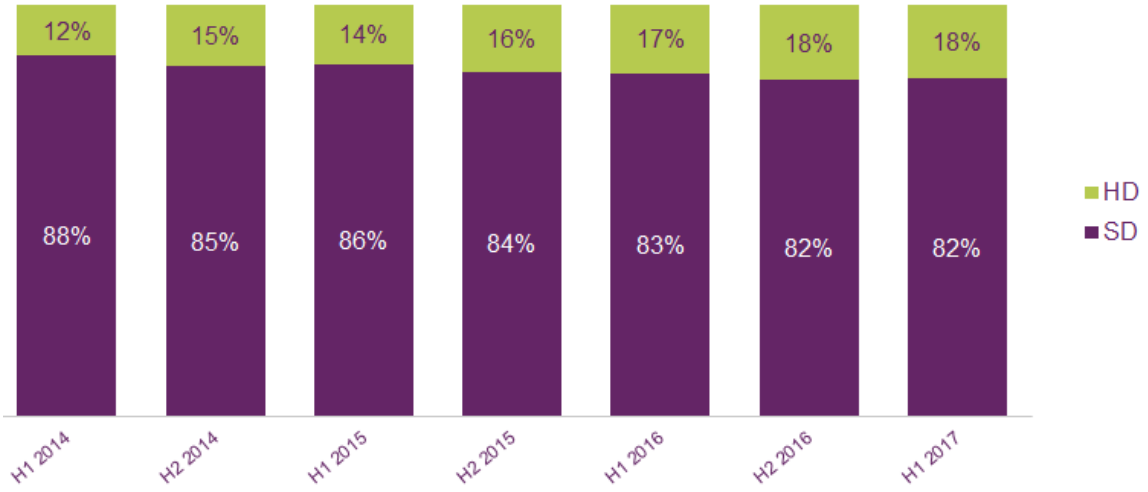
Figure 47: Take-up of HDTV sets and HD services, smart TVs and DVRs



Source: Ofcom Technology tracker, data as at January-February 2013-2017.
Base: All adults aged 16+ with a TV in the household: 2013 (3661), 2014 (3635), 2015 (3616), 2016 (3606), 2017 (3564)

9.11 Overall, the proportion of viewing to the HD versions of the main five PSB channels continues to grow slowly and now accounts for 18% of viewing. There is, however, a notable disparity between the amount of HD viewing of some PSB channels. For example, the HD viewing of BBC One is at 10% and Channel 5 at 36%.

Figure 48: Average contribution of viewing of SD and HD for the main five PSBs combined, by half year January 2014 – June 2017

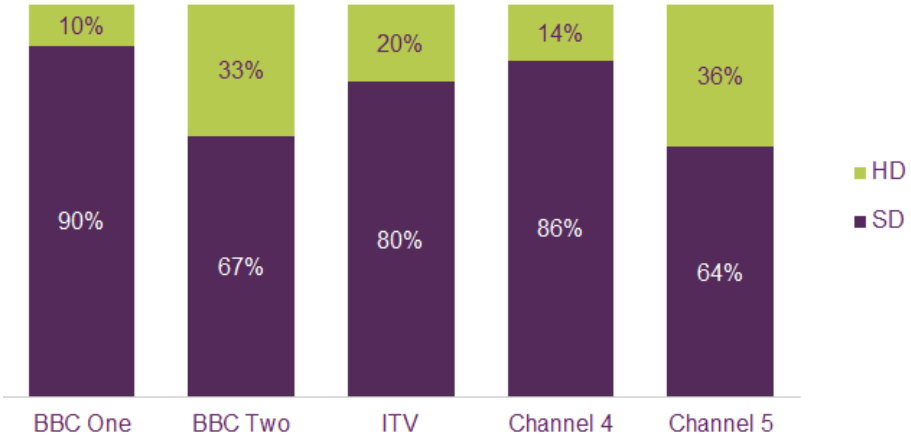


Source: BARB. Individuals 4+ with HD available in the home. Channels exclude +1 variants.

9.12 There are a number of potential reasons why HD viewing remains low, including: the much lower position of HD services in the electronic programme guide (EPG) of some platforms, the lack of regional opt-outs in some HD services, the lack of an easy means to return to

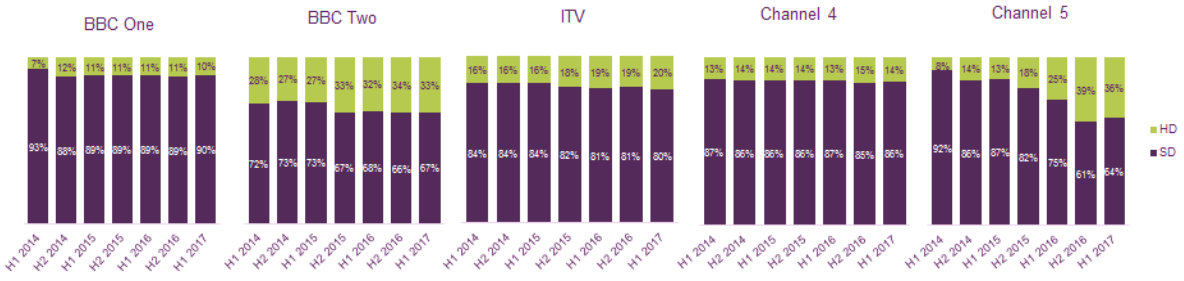
HD from regional SD services and, for some people and for small screens, the relatively small perceived difference in the quality of SD and HD. Figure 49 shows the average proportion of viewing of SD and HD for the main five PSBs individually, and Figure 50 shows the historical development by channel since 2014.

Figure 49: Average contribution of viewing of SD and HD January 2017 – June 2017



Source: BARB. Individuals 4+ with HD available in the home. Channels exclude +1 variants.

Figure 50: HD viewing contribution by main PSB channels H1 2014 to H1 2017



Source: BARB. Individuals 4+ with HD available in the home. Channels exclude +1 variants.

9.13 The last year has seen another significant increase in the number of UHD capable devices in homes as sales of UHD TVs have now reached over 40% by volume of the market. UHD content is available on UHD Blu-ray disc; via Satellite from Sky (through Sky Q silver's red-button - covering the Premier League, Formula 1 and cricket); and online through BT's Ultra HD YouView box and Amazon's Fire TV. The DTG (Digital Television Group) D-Book specification has included provision for online UHD content since November 2016. However, the DTG's specifications make no provision for the carriage of UHD content on DTT.

A number of trends are driving up IPTV viewing

9.14 The total amount of data used on fixed networks has grown by a further 53% over the past year, driven in large part by video. A number of distinct trends suggests that video traffic will continue to grow over fixed networks:

a) **Increased take-up of broadband services:** Most households now have a TV or set top box connected to the internet. As shown in Figure 47, 38% of households have a smart TV. We estimate a further 36% have a connected box.[116]

b) **Growth in hybrid TV services:** The growing range of hybrid broadcast/broadband services and devices is likely to further increase the consumption of broadband TV services. In addition, the improving ease of use of these services supported by better user interfaces, and a more joined-up integration of broadcast and online content, with new features (such as restart from linear channels) are making it easier and more beneficial for viewers to access on-demand connected TV services.

c) **Growth in online catch-up TV viewing:** Catch-up is a significant and growing mode of TV viewing - fuelled by DVRs, connected boxes, smart TVs and new hybrid features. And, as more catch-up viewing is carried out online, the demands for internet bandwidth and capacity are likely to grow further.

d) **Growth in other online TV services:** The use of non-catch-up video-on-demand services also continues to grow. For example, the proportion of adults watching short online video clips on YouTube has risen from 20% in 2014 to 38% in 2017.[117]

e) **The use of subscriber video-on-demand (SVOD) is also growing:** For example, more households are subscribing to discretionary video-on-demand services such as Netflix, Now TV and Amazon Prime. However, subscription video-on-demand services are, on the whole, complementing rather than replacing conventional TV.[118]

f) **Finally, there is a growing take up of linear IPTV services.** Linear internet TV (IPTV) services, such as BT 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.

9.15 As consumers move onto faster 4G and 5G mobile services it is expected that video viewing on mobile phones will continue to increase, but it is an open question as to whether this will be of live TV services or on-demand content.

Implications of changing viewer behaviour for broadband Infrastructure

9.16 As discussed in Section 4, nearly all (99%) broadband connections are, in principle, now capable of delivering IPTV in standard definition, since they have a speed of above 2Mbit/s. 97% of premises could have a service of at least 10Mbit/s, and 92% of premises could have

[116] See page 80 of the UK Communications Market Report 2017.
https://www.ofcom.org.uk/__data/assets/pdf_file/0017/105074/cmr-2017-uk.pdf
[117] See page 13 of the UK Communications Market Report 2017.
https://www.ofcom.org.uk/__data/assets/pdf_file/0017/105074/cmr-2017-uk.pdf
[118] See page 43 of the UK Communications Market Report 2017.
https://www.ofcom.org.uk/__data/assets/pdf_file/0017/105074/cmr-2017-uk.pdf

a service of at least 24Mbit/s. However, in practice, consumers may not always receive the maximum speed that is available on that connection. We explain the reasons why in 4.38.

9.17 Currently, a broadband connection speed of at least 2Mbit/s is needed to deliver an SD video stream, from 6 to 8Mbit/s for an HD stream, and from 20 to 25Mbit/s for a UHD stream. In practice, higher headline broadband speeds than these may be needed to achieve a good consumer experience. This might be because other services might be being accessed at the same time over the broadband connection, or the headline connection speed is not available all of the time due to congestion in the internet delivery chain.

9.18 The performance of in-home networks, in particular inter-room wifi connections in certain building types, or in higher density housing, can also reduce the overall performance of the broadband TV connection.

9.19 The new and more efficient HEVC (High Efficiency Video Coding) compression standard is helping to reduce the connection speeds needed to deliver video. This standard is being used to deliver the new UHD services available from Amazon Prime, BT, Netflix and YouTube. Despite the use of this more efficient compression standard, BT currently recommends that a connection speed of at least 44Mbit/s is needed to access its UHD sports services.

9.20 If HEVC is more widely utilised for IPTV, it could also reduce the connection speeds required to deliver SD and HD services.

Implications of changing viewer behaviour for broadcast infrastructure

9.21 Viewers are starting to embrace higher resolution, more life-like TV services, and the use of internet connectivity to access a wider range of content at times that are more convenient to them. To meet these expectations, TV platforms need to continue to evolve; including:

a) Enhancing their hybrid DTT/broadband TV offer; and

b) Upgrading broadcast transmission and transmission standards.

9.22 Some of the improvements are already underway. For example, the Freeview Play service offers consumers easier-to-use IPTV services, the Freeview label is now available only for HD and UHD products as of 2017 and the D-Book specifications now support UHD IPTV services. A number of platform providers such as Sky's Now TV and Youview from BT and TalkTalk integrate DTT and IPTV services. The Sky Q platform also integrates satellite and IPTV services, and offers a growing range of content in UHD.