



Market Impact Assessment of the BBC's High Definition Television Proposals

Statement

Publication date: 18 September 2007

Contents

Section		Page
1	Executive Summary	3
2	Introduction	11
3	Background and market developments	17
4	Impact on relevant products and services	32
5	Recommendations and proposed modifications	56
Annex		Page
1	Joint BBC Trust/Ofcom description of service	58
2	Terms of Reference	65
3	Counterfactual Scenarios – without the BBC HD channel	69

Section 1

Executive Summary

- 1.1 The current BBC Royal Charter and Agreement, which came into effect on 1 January 2007, established a Public Value Test (PVT) regime to assess whether the BBC's proposals to launch new services in future – or to amend existing services – would be in the wider public interest.
- 1.2 As part of the PVT, Ofcom carries out a Market Impact Assessment (MIA), the purpose of which is to assess the likely impact of the proposed services on products and services which are substitutes or complements with the proposed BBC service.
- 1.3 This document sets out the findings of Ofcom's second MIA to be carried out in the context of the new PVT regime. It considers the market impact of the BBC's proposed High Definition television (HDTV) channel. The MIA has been conducted in accordance with the Terms of Reference agreed by the Ofcom-BBC Trust Joint Steering Group, and with the MIA methodology agreed between Ofcom and the BBC Trust.

The proposed BBC service

- 1.4 In March 2007, the BBC Executive applied to the BBC Trust for permission to introduce a new HDTV channel. It would be a mixed-genre channel, drawing from content across the BBC's channels, and would aim to meet the BBC's public purposes. The channel would be available free-to-view, and would carry no advertising.
- 1.5 The BBC Executive is seeking approval to provide a service of nine hours per day, 15:00 to midnight, with some flexibility to extend beyond this to allow for the coverage of significant live sport or other events. At launch, the channel would offer a schedule of three to four hours per day, building to nine hours in late 2008. Virtually all the content (more than 95% of the schedule) will be HD versions of programmes broadcast in standard definition on other BBC channels
- 1.6 The intention is to make the HD channel available on digital satellite, digital cable and digital terrestrial television. The BBC Executive may also make the channel, or content from it, available on the internet, subject to value for money considerations and as technology allows. This could be through both bbc.co.uk and internet protocol TV providers.
- 1.7 The BBC Executive has identified two mutually exclusive options for digital terrestrial television (DTT): the full nine-hour schedule or a four-hour schedule overnight between 0200 and 0600.
- 1.8 The BBC Executive application states that the four-hour overnight schedule would be offered ahead of digital switchover (DSO) and possibly after switchover if insufficient spectrum capacity were available during the transmission hours of the nine-hour schedule.
- 1.9 Under the option where sufficient spectrum capacity becomes available following digital switchover, the four-hour overnight schedule on DTT would

be replaced by the same nine-hour service as provided over the cable and satellite platforms.

- 1.10 The four-hour overnight schedule would offer selected highlights from the following day's nine-hour schedule on cable and satellite. In order to provide capacity for this at launch, the BBC Executive proposes to take down the following services from Freeview between the hours of 0200 and 0600:
- BBC Four until close-down;
 - BBC Parliament, when broadcast;
 - two BBCi interactive video streams (accessed through the red button on remote controls);
 - the BBCi interactive news loop (also accessed through the red button – for the avoidance of doubt, BBC News 24 would not be affected).

Our approach

- 1.11 Our assessment of the market impact of this service has been based on:
- A full stakeholder engagement programme – including written submissions, and a series of meetings with interested stakeholders
 - Consumer research commissioned specifically for this MIA. This research was carried out for Ofcom by Illuminas, and is published alongside this Ofcom report
 - Desk research, and Ofcom's own qualitative and quantitative analysis.
- 1.12 Our analysis has also drawn on the research and analysis provided by the BBC Executive. Throughout the process, we have maintained regular communication with the BBC Trust Unit, with the aim of ensuring that the PVA and the Ofcom MIA are based on a broadly consistent set of assumptions, and that the PVA and MIA both provide evidence on all relevant issues.
- 1.13 In carrying out this MIA, we take account both of 'negative' substitution effects and 'positive' market creation effects. We also consider both static effects (the impact on demand for other products and services assuming no change in behaviour by other providers in response to the BBC service launch) and dynamic effects (through changing market behaviour, and impacts on investment and innovation by other providers in response to the BBC service). Our relevant analysis period focuses on the next five years.
- 1.14 There is much uncertainty about the likely development of HD services in the UK over the next five years. Take-up of HD Ready television displays has increased significantly, but take-up of HDTV services remains in an early stage – in June 2007, there were around 460,000 HDTV subscribers, out of a total 24m UK households. It is a widely held view that take-up of HD services will accelerate over the next few years, but there is no consensus about whether HDTV will become a mass-market proposition in the UK.
- 1.15 This uncertainty about future HD take-up poses challenges for this MIA, as we need to assess the impact of the BBC service against the counterfactual

of a scenario in which the BBC does not launch an HD channel – but in which other drivers towards HD (including HD production and HD broadcasting by other players) continue to develop. In the light of the significant degree of uncertainty over the future of HD take-up, we have considered three scenarios for this counterfactual – a central scenario, which forms the basis for the majority of our analysis, and higher and lower scenarios around the central case. This summary focuses on the central scenario, and we report sensitivity analysis in Section 4 of this document.

Impact on affected products and services

1.16 The terms of reference for this MIA noted that the following products and services could be affected by the launch of the BBC HD channel:

- TV platform services and network services
- Broadcast services on various delivery platforms
- Provision of content – including programme-making and rights exploitation
- Hardware and software, including television reception equipment, recording and playback equipment, and physical media
- On-demand services.

1.17 We have considered the likely market impact in each of these areas. Before summarising our findings, we note that industry stakeholders were largely supportive of the BBC's proposed HD channel, although they raised some concerns about specific aspects of the BBC's proposals. We also note that the key impacts arising from the BBC HD channel launch are likely to relate to take-up of TV platforms, and to broadcast services.

Impacts on TV platforms

1.18 In terms of TV platforms, the main impacts are likely to be as follows:

- The BBC HD channel is likely to deliver consumer benefit through increased take-up of HD. This positive impact is likely to be spread across the major TV platforms, including DTT, satellite and cable. It seems likely to support the relative position of the DTT platform in the longer term (although, as discussed below, the position of DTT will be affected by the nature of the BBC HD service on DTT), and also to encourage the take-up of the new PSB Freesat platform. At the same time, the pay satellite and cable platforms could benefit from increased subscriptions to their HD services. Because the market position of different broadcasters and TV service providers differs across platforms, we consider it a positive factor that the benefits are likely to be spread across all these major platforms
- The impact on DTT is the most complex. The BBC's HD channel, when taken together with the likely response of other PSBs in accelerating their move into HD broadcasting, could help to maintain the position of the DTT platform in the longer-term (as long as the DTT platform has sufficient capacity to carry a number of HD services)

- But there is some risk of DTT platform erosion in the period where the nine-hour service is available on other platforms, but not on DTT. Our discussions with stakeholders have noted these possible impacts, but have suggested that the extent of the impact may not be significant in the core period covered in this MIA
- The PSBs have raised concerns over switching from DTT in the longer term, if the full BBC HD service does not become available on the DTT platform. We recognise the relevance of this issue, but this MIA is not the place to reach conclusions about the way in which multiplex capacity might be used to transmit HD services on the DTT platform – these issues are being actively addressed elsewhere. Nonetheless, we recommend that the current PVT process should be concluded in such a way as to ensure that the launch of the BBC HD channel on DTT does not create barriers to the delivery of a number of HD services on the DTT platform – such barriers may arise if, for instance, the BBC's launch were implemented in such a way that it holds back the use of new transmission technologies (such as DVB-T2) on DTT
- A secondary effect of the BBC HD launch on DTT may be that the number of homes that are equipped with an MPEG4 capable DTT set top box will increase faster than if there were no BBC HD service. This will potentially allow the earlier, commercially viable, introduction of MPEG4 SD channels and/or the conversion of MPEG2 channels to MPEG4 - this could increase spectrum efficiency as more channels will be offered in the same bandwidth. We note that any move to MPEG4 would be subject to a separate Ofcom decision-making process. Nonetheless, we note that this could be a positive impact of the BBC HD channel launch, albeit one which has costs attached – in terms of the cost incurred by consumers in upgrading to MPEG4 set top boxes
- Due to capacity constraints, the relative position of internet protocol TV (IPTV) platform operators may suffer if there is significant consumer demand for HD services – as current broadband infrastructure does not allow HD services to be delivered to a significant number of consumers. Our discussions with stakeholders also highlighted that this issue could become more significant in the medium term, especially if there is significant HD take-up. In order to compete effectively with other platforms, IPTV providers may be required to expand capacity on their networks. We note here that the BBC Trust and the BBC Executive should engage with relevant industry stakeholders before launching an HD channel on IPTV.

Impact on broadcast services

1.19 Some substitution from commercial TV channels to the BBC HD channel is possible, but our consumer research and discussions with stakeholders suggest that this is likely to be modest:

- In the short-term, there may be some negative impact on the viewing shares of commercial broadcasters (both directly through channel substitution, and indirectly through platform substitution effects), and hence on their revenues. However, consumer research and stakeholder comment suggests that channel viewing is shaped more by content rather than picture quality – and so these effects are unlikely to be significant

- It is, however, possible that developments in platform capacity could increase the extent of channel substitution in the longer term. If the BBC is able to launch a full HD service on DTT, but others find that they lack the capacity to do so, then the BBC HD channel could be the only HD channel on DTT. If these circumstances were to arise, then some stakeholders have argued that they could lead to more material channel substitution on the DTT platform from commercial SD channels to the BBC HD channel. This view is not shared by all stakeholders, and we are not convinced that this impact is likely to be material – in particular, we have not been presented with any compelling evidence to suggest that this should prevent the BBC from launching the HD channel on DTT
 - We have also noted that some greater negative impact is possible if the BBC HD channel moves away from a mixed-genre service – for instance, the impact could be greater if the channel shows many movies in HD. To guard against this risk, we recommend that the BBC Trust ensures that the HD channel's service licence holds the BBC to the mixed genre content model, as set out in the service description agreed at the start of the PVT process.
- 1.20 In addition to the above, the BBC HD channel launch could have a significant impact on other broadcasters' plans to launch HD services. Many stakeholders told us that the BBC HD channel is likely to strengthen the commercial rationale for HD broadcasting, and so accelerate the pace at which other PSBs move into HD broadcasting.
- 1.21 Although the PSBs believe that they will eventually move into HD broadcasting anyway, the commercial model for free to air HD broadcasting is currently unclear – subscription providers are able to monetise the increase in consumer value through charging for HD access, but this avenue is not available to free to air broadcasters. As a result, HD channel launch by other broadcasters would most likely happen on a longer timetable in the absence of a lead taken by the BBC.
- 1.22 However, if the BBC launch promotes consumer take-up of HD services, it could improve the commercial rationale for HD channel launch by free to air commercial broadcasters. In any case, the broadcasters indicated to us that such launch would most likely represent a defensive move, intended to protect the DTT platform on which PSBs maintain a relatively strong audience share.

Impact on content provision

- 1.23 The BBC Executive has stated that it is transitioning to full HD production, regardless of the launch of an HD channel, and that the timetable of the BBC's move to HD production will not be affected by the channel launch. As such, the BBC has argued that there will be no incremental market impact in this area.
- 1.24 However, the general view amongst stakeholders differs from that of the BBC. Stakeholders tended to argue that the BBC HD channel launch will promote HD commissioning and production at the BBC, as the BBC is one of the largest commissioners and producers of programming; and that it may be difficult for the BBC to justify producing all programming in HD purely for domestic consumption in the absence of an HD channel. Nonetheless,

stakeholders also noted that HD production is likely to grow naturally, due to demand from international markets; and that the cost differential between HD and SD production is already declining. Overall, there may be some market impact here, although the scale of any impact is likely to be modest.

- 1.25 Stakeholders argued that, over the medium to longer term, the impact is more likely to be positive (or at worst, neutral): the BBC HD channel launch is likely to accelerate the transition to HD production, and spread the skills needed for content production in the HD environment. In due course, this is likely to help reduce the cost differential between HD and SD production, benefiting the industry as a whole.
- 1.26 Beyond production, it is possible that the BBC HD channel might affect competition for events rights – however, this is unlikely to be significant since the service description requires that 95 per cent or more of the HD channel schedule would be HD versions of programmes broadcast in SD on other BBC channels. As such, the events broadcast on the HD channel will be common to other BBC channels. Nonetheless, we recommend that the BBC Trust continues to monitor the BBC Executive's activities in bidding for events rights, so as to ensure that a significant market impact does not arise in the future.

Impact on equipment and physical media

- 1.27 As noted earlier, we expect the BBC HD channel to promote greater take-up of HD services. This is likely to have a knock-on positive market impact on the take-up of HD equipment – such as HD set top boxes and satellite dishes – and so will have a positive impact on manufacturers and retailers of such equipment. There is unlikely to be a significant incremental impact on the take-up of HD Ready TV sets, as there is in any case a general consumer shift towards HD Ready displays.
- 1.28 Any impacts are, however, unlikely to lead to a significant change in equipment manufacturers' and retailers' producer surplus – as equipment markets are competitive, and changes in demand in the market place will be responded to reasonably quickly by producers. As such, any gains to particular producers will be quickly reduced as other producers enter the market to increase supply of these products and services, thereby reducing prices. This effect may, however, drive an increase in consumer surplus, as a result of the combination of increased consumer demand and reduced prices for equipment.

Impact on on-demand services

- 1.29 The BBC Executive plans to make available content from the HD channel via its iPlayer on-demand catch-up service when it is technically feasible to do so. In the MIA of the BBC's on-demand proposals¹, we noted that internet service providers (ISPs) are likely to need to invest in greater broadband capacity, as a result of consumer demand for on-demand content delivered via broadband internet. We argued that this would impose resource costs that were relevant to the on-demand PVT process.

¹ Ofcom, *BBC new on-demand proposals: Market Impact Assessment*, published 23 January 2006.

- 1.30 These costs are also relevant to the current PVT process in two potential ways. First, demand for downloading HD content is likely to impose greater costs on ISPs than downloading the same programme in SD, and / or it could lead to a deterioration in the quality of service experienced by users; this represents a resource cost which should be taken into account in the PVT assessment. Second, if ISPs were to seek to recover increased infrastructure costs from the BBC in return for quality of service guarantees, then there may be a direct financial cost to the BBC in the future.

Recommendations and proposed modifications

- 1.31 The nature of the market impacts identified means that we have not proposed significant modifications to the proposed service. Nonetheless, we make some important recommendations to the BBC Trust.

Nature of the BBC HD channel on the DTT platform

- 1.32 This MIA has noted that the launch of a BBC HD service cannot be considered in isolation of the wider discussions taking place in the industry about the future of HD on DTT – in particular about whether future technological developments, including the development of the DVB-T2 transmission technology, will enable the delivery of a number of HD channels on the DTT platform.
- 1.33 We have noted in this regard that some of the potential negative market impacts associated with the launch of the BBC HD channel may be more significant if the BBC's HD channel is the only HD channel on the DTT platform. Moreover, we have also found that some potential outcomes of the PVT process could create barriers to the delivery of a number of HD channels on DTT – if, for instance, the BBC's launch were implemented in such a way that holds back the use of new transmission technologies on DTT.
- 1.34 We understand that the BBC Trust is considering the BBC's proposals in the context of the potential delivery of a wider range of HD services on DTT. In particular, Ofcom considers it essential that the BBC HD channel is launched in such a way that it does not create barriers to the delivery of a number of HD services on the DTT platform.

BBC HD channel on IPTV and open internet platforms

- 1.35 Our analysis for this MIA has found that the launch of the BBC HD channel may create a negative impact on the position of IPTV platforms, relative to other digital TV platforms. This is because constraints on internet infrastructure mean that IPTV providers may not have sufficient capacity to deliver HD services to a significant number of consumers. While the BBC Executive intends to make the HD channel available on IPTV, the timing of such launch is uncertain, and may not be feasible until significantly into the future.
- 1.36 Nonetheless, as and when the capacity issues are resolved at some future point, the potential negative market impacts described above could be alleviated. Although we recognise that a solution to this issue is unlikely to be forthcoming in the near future, we recommend that the BBC Trust and BBC Executive engage further with industry stakeholders about the appropriate timetable for delivering HD on IPTV, with the objective of launching the HD

channel on IPTV as soon as it is technically feasible to do so. This could be formalised by including a requirement in the HD channel service licence requiring the BBC Executive to deliver a version of the channel on IPTV, subject to technical feasibility. This should also be subject to agreement with IPTV service providers, and subject to the PVT assessment taking appropriate account of resource costs of additional infrastructure.

- 1.37 A separate issue arises in relation to the delivery of HD content via internet on-demand services (e.g. the BBC's iPlayer) – this may create costs for ISPs through internet capacity requirements. We believe that the BBC Trust should take into account the costs arising in this area – if they are likely to be significant, they may offset the public value generated by the service.

Wider technology issues

- 1.38 We also note in this document that the emerging 1080p HD standard is not compatible with existing HD set top boxes and displays – its introduction would therefore have implications for existing HD customers and platform operators. The BBC Executive has not proposed to use 1080p for its HD channel and Ofcom has therefore not considered the impact of the BBC moving to 1080p as part of this MIA.
- 1.39 However, due to the potentially significant impact that such a move may have on existing HD viewers and platform operators, Ofcom believes that, if the BBC Executive does wish to move to the 1080p format in the future, the BBC Trust should consider carefully whether a further PVT would be required. It is important to note that we are not suggesting that a further PVT will definitely be needed – only that the BBC Trust should reserve the right to launch a further PVT if the industry environment at the relevant time suggests that such a process is necessary.

Service licence and wider regulation of the BBC HD channel

- 1.40 Although most stakeholders suggested that the BBC HD channel is not likely to lead to significant viewer substitution away from commercial channels, we have identified a risk that viewer substitution may be more significant if the BBC HD channel moves away from a mixed-genre service. For instance, the market impact may be greater if the channel were to show many movies in HD. As a result, and in order to minimise the risk of greater impact here, we recommend that the BBC Trust should ensure that the service licence for the BBC HD channel holds the BBC Executive to the mixed-genre service description. If the BBC has greater flexibility in this area, then the market impacts may become more significant.
- 1.41 We also noted earlier that the BBC HD channel is unlikely to have a significant impact on competition for events rights, as the events broadcast on the HD channel will be the same as those broadcast on the BBC's existing SD. However, we recommend that the BBC Trust continues to monitor the BBC Executive's activities in bidding for events rights – so as to ensure that the BBC adheres to the service description in this area. If the BBC Executive seeks to acquire more events rights than it would have done in the absence of HD channel launch, then the market impacts would most likely increase.

Section 2

Introduction

The role of the MIA in the PVT process

- 2.1 The current BBC Royal Charter and Agreement, which came into effect on 1 January 2007, provided for the establishment of a new Public Value Test (PVT) regime. The PVT must be applied before a decision can be taken to make any significant change to the BBC's UK public services, which can include the introduction of a new service or the discontinuation of an existing one.
- 2.2 Under the new regime, the decision on whether to authorise such a change will be made by the BBC Trust (the Trust), following the application of a PVT. In reaching a decision on a PVT, the Trust must take into account the findings of two separate reviews:
- A Public Value Assessment (PVA), carried out by the Trust Unit, which assesses the likely value of the service to licence fee payers, particularly in terms of its contribution to the BBC's public purposes
 - A Market Impact Assessment (MIA), carried out by Ofcom, which assesses the effect of the proposed service on other services in the market. It considers both the direct impact on consumers and producers of other services, for example in terms of price and choice, and the likely impact on competition and market development, which will affect consumer and citizen interests in the longer term.
- 2.3 This report represents Ofcom's MIA of the BBC's proposed High Definition Television (HDTV) channel. This section briefly summarises the approach we have taken to conducting this MIA. For more detail on the methodology adopted for Ofcom's MIAs, see the methodology document² published in May 2007.

The proposed service

- 2.4 The BBC Executive is applying for permission to provide a single, linear, digital TV channel in high definition (HD) format. The full service description was agreed by the BBC Trust and Ofcom at the outset of the PVT process, drawing on the BBC Executive's PVT application to the BBC Trust. The service description is summarised here, and the full service description is reproduced at Annex 1 of this document.
- 2.5 It would be a mixed-genre channel, drawing from content across the BBC's channels, and would aim to meet the BBC's public purposes. The channel would be available free-to-view, and would not carry advertising.
- 2.6 The BBC is seeking approval to provide a service of nine hours per day, 15:00 to midnight, with some flexibility to extend beyond this to allow for the coverage of significant live sport or other events. At launch, the channel

² Ofcom, *Methodology for Market Impact Assessments of BBC services*; published 22 May 2007.

would offer a schedule of three to four hours per day, building to nine hours in late 2008. Virtually all the content (more than 95% of the schedule) will be HD versions of programmes broadcast in standard definition on other BBC channels

- 2.7 The intention is to make the HD channel available on digital satellite, digital cable and digital terrestrial television. The BBC may also make the channel, or content from it, available via broadband, subject to value for money considerations and as technology allows. This could be through both bbc.co.uk and internet protocol TV (IPTV) providers.
- 2.8 The BBC Executive believes that there is currently not enough capacity on the Freeview (DTT) platform to launch a HD channel, without removing some other BBC services. This MIA is not an investigation into the nature of capacity on the DTT platform and Ofcom makes no judgement in this report as to whether this is a correct technical assumption. We have therefore assessed the BBC Executive proposals purely at face value.
- 2.9 The BBC Executive has suggested two mutually exclusive options for digital terrestrial television (DTT): the full nine-hour schedule; or a four-hour schedule overnight between 0200 and 0600.
- 2.10 The full nine-hour schedule would be offered on DTT if sufficient spectrum capacity were available after digital switchover (DSO).
- 2.11 The BBC Executive application states that the four-hour overnight schedule would be offered ahead of digital switchover and possibly after switchover if insufficient spectrum capacity were available during the transmission hours of the nine-hour schedule. However, it is also possible that the BBC Executive may review its options for providing HD on DTT if sufficient spectrum were not available after switchover.
- 2.12 The four-hour overnight schedule would offer selected highlights from the following day's nine-hour schedule on cable and satellite. In order to provide capacity for this at launch, the BBC Executive proposes to take down the following services from Freeview between the hours of 0200 and 0600:
- BBC Four until close-down;
 - BBC Parliament, when broadcast;
 - two BBCi interactive video streams (accessed through the red button on remote controls);
 - the BBCi interactive news loop (also accessed through the red button – for the avoidance of doubt, BBC News 24 would not be affected).
- 2.13 These changes would be subject not only to PVT approval by the BBC Trust but also to a separate Ofcom process. The DTT multiplex on which the BBC transmits the channels is licensed by Ofcom, so an application to Ofcom for a variation of the multiplex licence would be required.
- 2.14 Under the option where sufficient spectrum capacity becomes available following digital switchover, the four-hour overnight schedule on DTT would be replaced by the same nine-hour service as provided over the cable and

satellite platforms. This would happen as digital switchover proceeds region by region. Full national coverage would be achieved on completion of digital switchover in 2012.

Our approach to the MIA

- 2.15 This MIA has been carried out in accordance with the terms of reference³ published in May 2007, which are reproduced at Annex 2 of this document. In those terms of reference, we noted that this MIA would consider the potential impact of the BBC's HDTV proposition on the following products and services, which are discussed in more detail in subsequent sections of this document:
- Broadcast services on various delivery platforms
 - TV platform services and network services
 - Provision of content – including programme-making and rights exploitation
 - Hardware and software, including television reception equipment, recording and playback equipment, and physical media
 - On-demand services.
- 2.16 The MIA process seeks to identify all of the ways in which the above products and services might be affected by the BBC's proposals – considering both 'negative' substitution effects and 'positive' market creation effects. For instance:
- The MIA considers the extent to which the BBC's proposed HD channel is likely to induce substitution away from competing broadcast services and the ways in which that substitution could, in principle, reduce investment in new services, and potentially reduce choice for consumers and citizens
 - On the other hand, the BBC's proposals could in some cases generate benefits, both for other service providers or for consumers. They may complement other services and thereby drive increased investment – for instance by promoting take-up of HD services more generally. They may also lead to an increase in consumer choice. These effects would have positive implications for consumers and citizens.
- 2.17 Where there is the potential for significant adverse effects, the MIA may propose modifications or conditions designed to limit these adverse impacts.
- 2.18 It is important for the MIA to consider both the static and dynamic effects on the above products and services, in terms of their potential impacts on welfare for both consumers and producers:
- Static effects are concerned with the direct impact of the BBC HD service on the demand for other products and services, without taking account of how other providers might respond to the launch of the BBC service – for example by altering their pricing policies or investment plans. This static

³ Ofcom, *Market Impact Assessment of the BBC's High Definition Television Proposals – Terms of Reference*; published 22 May 2007.

assessment relates to the change in consumer surplus⁴ and producer surplus associated with shifts in demand for competing services

- In practice, other service providers are likely to change their behaviour in response to the existence of the BBC service, and these dynamic impacts can have a significant longer-term impact on competition and market development. In particular, we are interested in the extent to which the BBC's HD proposals might impact on innovation and investment in HD-related products and services by the commercial sector, and potentially in the longer term by the BBC itself. Were commercial providers to be deterred from seeking to offer competing services this would ultimately have the effect of reducing choice for viewers, to the detriment of the public interest as a whole. On the other hand, were the BBC proposal to promote HD investment in the commercial sector, then this could represent a positive market impact.

2.19 The relevant core analysis period for an MIA is to focus on the next five years. In our view, five years provides a reasonable balance between the need to consider the impact on nascent services as they evolve towards maturity, and the desire to avoid unduly speculative projections. However, because there are a number of significant issues around the evolution of DTT capacity to transmit HD services, we do need to give some consideration to longer term factors that are relevant beyond the end of digital switchover in 2012.

2.20 The assessment of the above effects is challenging because the BBC's HDTV channel would be provided in a newly emerging market, the future size and characteristics of which are difficult to predict. Although most industry stakeholders and commentators believe that HD take-up will increase over the coming years, there is no consensus about the extent of this take-up. As a result, there will inevitably be a considerable degree of uncertainty around any estimates of likely impacts.

2.21 There are several aspects to this uncertainty:

- Firstly, in relation to the characterisation of the way in which the relevant products and services might develop in the absence of the BBC's HD channel (e.g. the pace at which HD channels are introduced by other broadcasters and over which platforms they are introduced). This "counterfactual" scenario provides the reference point against which we assess the incremental impact of introducing the BBC HD channel. We have handled this type of uncertainty by carrying out our assessment against a plausible central scenario, drawing on BBC Executive's projections and the views of other industry commentators and stakeholders, and then considering the implications of variants around this central case
- Secondly, in relation to the scale of the static impact relating to the introduction of the BBC HD service (for example, how many new HD viewer hours relate to a switch in viewing away from commercial channels). Whilst consumer research can provide evidence to support our analysis, the lack of real consumer experience of the proposed BBC HD channel means that this evidence can be of limited value only

⁴ This reduction in consumer surplus will need to be offset against the gross gain in consumer surplus from use of the BBC services – the latter will, by definition, exceed the former.

- Thirdly, in relation to the way in which other service providers might respond to the launch of the BBC HD channel. We have held discussions with the main service providers likely to be affected (broadcasters, platform providers, programme production bodies) to help us assess the nature and possible scale of these dynamic effects. However, it was clear that these stakeholders themselves regard the way the market might evolve – and the way in which they might therefore respond to the launch of the BBC HD channel – as subject to significant uncertainty.

The sources of evidence for this MIA

- 2.22 This MIA has been informed by a full stakeholder engagement programme, consumer research commissioned specifically for this MIA, and by Ofcom's desk research and analysis.
- 2.23 In order to engage fully with stakeholders, we published a stakeholder questionnaire at the start of the MIA process in May 2007. We received 13 written responses to that questionnaire in June 2007. Our review of these written responses was complemented by a series of meetings and discussions with interested stakeholders⁵ over June and July 2007. In the light of the uncertainty about the future take-up of HD services, we have placed significant weight on the views of these stakeholders who are the market participants most likely to be impacted by the launch of the proposed the BBC service. We are therefore grateful to all stakeholders who provided views and information to Ofcom – including the BBC Executive, who provided us with important information and insights throughout the MIA process.
- 2.24 We also commissioned Illuminas to carry out a survey of 400 existing subscribers to HDTV services, and the Illuminas research report is published alongside this Ofcom report. We focused our consumer research on this group, as we felt it would be the most effective means of assessing how the BBC HD channel launch might affect the behaviour of HD users. We recognise, however, that the respondents to our consumer research survey are likely to be early adopters of HD and other consumer propositions, and as a result their behaviours may not be representative of the UK population as a whole. We decided not to commission additional research focused on the likely behaviours of a representative sample of the population as a whole, as such research would overlap significantly with that already commissioned by the BBC Trust. This MIA has therefore drawn on the BBC Trust's consumer research, which focused on the attitudes and likely behaviours of the overall population, and also on separate research commissioned by the BBC Executive.
- 2.25 The above sources of evidence have informed Ofcom's own analysis of the possible market impacts. In line with the MIA methodology agreed between Ofcom and the Trust, we have sought to quantify effects where this is practical and proportionate. However, it is important to note that we have not carried out detailed modelling of the market impacts – largely because the nature of the issues raised by stakeholders suggested that detailed modelling would not be proportionate in this case. We have therefore carried out some

⁵ During the MIA process, Ofcom received submissions from and/or had discussions with the following organisations: BBC Executive, BSkyB, BT, Channel 4, DTG, Five, Humax, ITV plc, National Union of Journalists, Pace, Skillset, Thomson, Tiscali, UK Screen Association, Virgin Media.

quantification in order to illustrate the potential scale of the market impacts, and we have attached appropriate weight to qualitative, as well as quantitative, analysis.

Section 3

Background and market developments

- 3.1 This section provides the background to Ofcom's analysis of the market impact of the launch of the BBC HD channel. This section explains:
- The value chain for HD delivery, and the services that could be affected by launch of a BBC HD channel. These services were briefly discussed in the MIA Terms of Reference referred to in the previous section
 - The technical aspects of HD, and how it has been developing as a service in the UK. We outline the projections of HD take-up by the BBC Executive and third party industry commentators. The views of stakeholders about the development of HD within the UK are also described
 - The counterfactual against which we assess the impact of the BBC's proposed service.

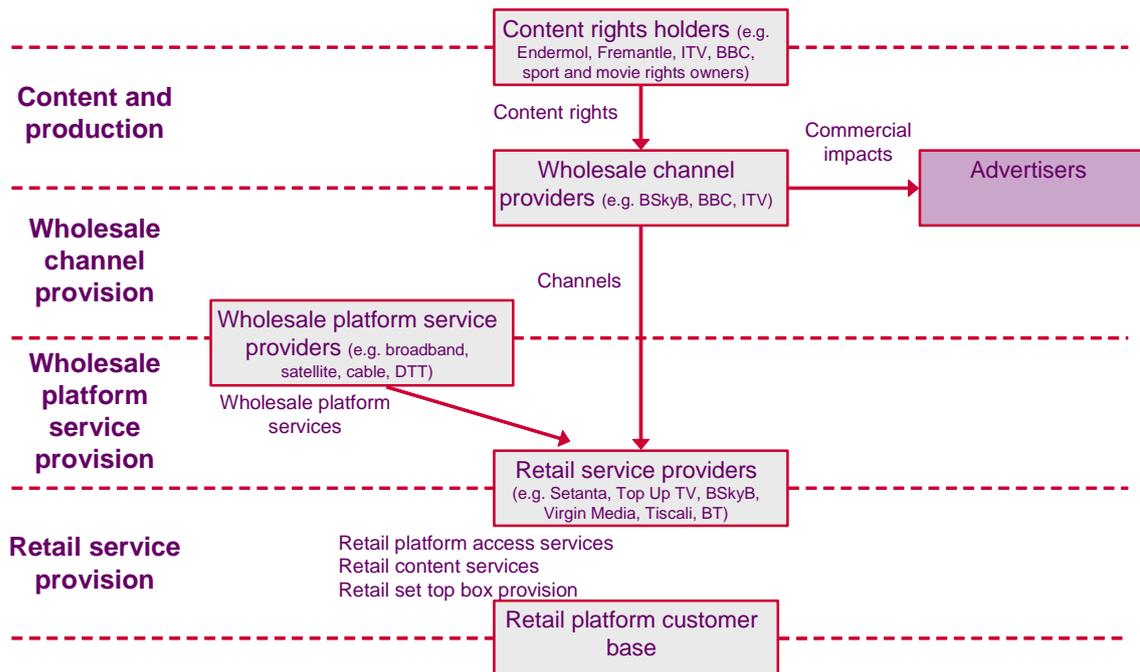
Value chain for HDTV services

- 3.2 Figure 3.1 below illustrates the value chain for HDTV provision. In practice, a number of operators in the broadcasting industry are vertically integrated and operate at multiple layers of the value chain. For example, BSkyB is a vertically integrated wholesale channel provider, wholesale platform service provider and retail service provider.
- 3.3 The value chain comprises four basic layers:
- **Content and production** – this layer includes the companies or organisations which produce programmes/films, perform other creative services, and hold intellectual property rights for programme content / films. In this case, this is likely to include rights to broadcast events in HD, rights to broadcast HD video content, producing original content in-house or commissioning productions in HD. These providers often draw on companies who provide inputs into programme making (for instance, equipment manufacturers) and post-production companies (who provide services such as editing). This layer includes programme-making activity both within the main broadcasters (in-house production at the BBC and ITV) and external production through the use of qualifying and non-qualifying independent producers (e.g. RDF Media, Endemol and TalkbackThames). This layer also includes members of the UK Screen Association, who are involved in providing inputs into the production stage (such as post-production services, audio, visual and special effects, DVD, camera, lighting and equipment hire, new media outside broadcast and studios)
 - **Wholesale channel provision** – this layer includes the companies/organisations which provide and control the TV channels/services which are ultimately retailed to viewers by retail service providers – for instance, bundling HD programmes together into channels and on-demand packages, and wholesale supply of content services e.g. wholesale supply of an HD channel to a platform provider. At this level, broadcasters such as the BBC both commission programmes, and

acquire 'off the shelf content' and events rights which they then arrange into schedules. Similarly Tiscali, an IPTV supplier, chooses the content to be provided via its IPTV service

- Wholesale platform service provision** – this layer involves companies which operate wholesale TV broadcasting platforms and companies which provide technical capacity and transmission related services to retail service providers for TV channels and other content to be distributed to viewers/subscribers over those platforms. This layer includes the network providers such as Arqiva and NGW (who provide transmission capacity for the terrestrial network) and Astra (which provides the satellite capacity for Sky's services), BSkyB (which operates the satellite platform) and broadband network providers
- Retail service provision** – this layer involves companies that retail platform access services (e.g. provision of TV reception equipment) and content services (e.g. HD TV channels and on-demand packages) to consumers, and make arrangements for customer support services such as call centres. Retail supply involves the sale to end consumers of access to a platform and channel/on-demand content. This layer also includes the retail suppliers of access and channel/on-demand packages such as Sky and Virgin Media, and retailers of set top boxes.

Figure 3.1: Illustrative value chain for HD services



3.4 Demand and supply of related technology, such as set top boxes, HD Ready TV sets, HD DVDs and PVRs, could also be affected by the broadcasting of HD services, even though these are not part of the value chain. Similarly, television services are often bundled with telephone and broadband services in the retail packages offered to consumers – this may have implications for ease of switching.

- 3.5 Aside from the licence fee, which is used to fund BBC services, the services above are funded in a number of ways. First, many consumers pay directly for a set of TV services, i.e. they subscribe to TV services provided by Sky, Virgin Media, BT Vision and many others. This may be on a subscription or pay per view basis. Second, many channels receive their revenues from advertisers and sponsors. These channels broadcast programmes to attract viewers and sell time slots within and between programmes to advertisers who wish to reach those viewers. A third source of revenues is the income from phone calls relating to participation TV. Finally, programme makers sell programmes and programme formats to overseas markets.

The relevant products and services

- 3.6 The terms of reference for this MIA included the following list of the products and services which could be affected by the launch of the BBC HD channel:
- Broadcast services on various delivery platforms
 - TV platform services and network services
 - Provision of content – including programme-making and rights exploitation
 - Hardware and software, including television reception equipment, recording and playback equipment, and physical media
 - On-demand services.
- 3.7 Section 4 of this document considers the nature and scale of the potential impacts on the above products and services, all of which are relevant to the value chain for HD broadcasting. At this stage, it is useful to describe these relevant products and services more fully. It should be noted that all of these include both HD and SD provision:
- **Broadcast services on various delivery platforms** – this involves the provision of wholesale channel and wholesale content services. These service providers purchase content and programming from content providers which they then bundle into channels. Aside from the BBC, they also deal with advertisers and programme sponsors, inserting advertisements within the programme schedule. Some channels are provided to retailers (who sell on access to the platform and a suite of channels to consumers), whereas other channels are provided free to air and end consumers can access them as long as they have the required reception equipment. Broadcast services do not include the provision of on-demand services
 - **TV platform services and network services** – the activities of companies who provide the physical means of broadcasting channels to end viewers and/or the physical capacity to enable the downloading of on-demand services. In other words, the providers of the terrestrial broadcasting platform, the satellite platforms, the cable platforms and broadband networks. This also includes the retailing of pay-TV services which are tied to a specific platform – such as subscription packages available on satellite, cable and IPTV platforms

- **Providers of content** – companies and individuals who own events rights and/or are involved in programme making. They may be independent companies or part of a company which is vertically integrated across several levels of the value chain (e.g. ITV, BBC). They often draw on the services of companies who provide inputs into programme making, for instance, manufacturers and leasers of professional camera equipment, make-up artists, and companies in the post production sector, who provide services such as colour correction and editing
- **Hardware and software including television reception equipment, recording and playback equipment, and physical media** – this includes supply of set top boxes, television sets, personal video recorders (PVRs) and related technology such as DVD players and DVDs themselves, games consoles and programmes
- **On-demand services** – the provision of content to the end viewer which is not a scheduled broadcast. In other words, the viewer selects the content he or she wishes to view and this is then streamed at that moment, or downloaded as a file for them to watch as and when they choose.

Overview of HD Technologies

3.8 Production and transmission of HD television has technology implications at every stage of the TV value chain. Choice of technology can not only affect the consumer proposition but also the costs incurred by the broadcasters and platform operators. An understanding of the underlying technologies used to produce and deliver HD services is therefore required before the extent of the impact can be considered.

HD formats

- 3.9 The pictures of standard definition TV service broadcast in the UK are made up of 576 horizontal lines, each of which is refreshed 25 times per second. High definition TV uses more lines to increase the resolution of the picture, leading to pictures being sharper and more realistic. HD services are usually accompanied by multi channel “surround sound” audio rather than the simple stereo audio tracks broadcast with most SD services. The combination of improved pictures and immersive sound can dramatically improved the viewing experience.
- 3.10 There are two HD formats commonly in use today. In the first format, ‘720p’, TV pictures are made up of 720 horizontal lines, each of which is refreshed 50 times per second. The second format, ‘1080i’, has a higher resolution picture (1080 lines) but each line is refreshed 25 times per second. All HD equipment carrying an EICTA⁶ “HDTV” or “HDReady” logo is able to process and/or display both 720p and 1080i signals and consumers will often be unaware of which format is being used for a particular HD programme.
- 3.11 The BBC has not detailed whether different HD formats (720p or 1080i) will be used on different platforms. For the purposes of the MIA Ofcom has assumed that, even if different formats are used on different platforms,

⁶ The European Information & Communications Technology Industry Association, see <http://www.eicta.org/> for details.

consumers will not have a material preference for one format over another. Consequently, Ofcom has not considered the possibility that demand for the BBC HD services will differ between platforms as a result of the HD format being used.

- 3.12 A new HD format, '1080p' is emerging, which combines the higher resolution of 1080i with the higher refresh rate of 720p – i.e. 1080 lines, with each line refreshed at 50 times per second – and is already supported by some HD display manufacturers. There is potential that consumers will consider 1080p the “gold standard” for HD and actively seek out services and equipment that use it. However, 1080p is not compatible with existing HD set top boxes and its introduction would therefore have implications for existing HD customers. In the Service Description the BBC has not proposed to use 1080p for its HD channel and Ofcom has therefore not considered the impact of the BBC moving to 1080p as part of the MIA. Due to the potentially significant impact such a move may have on existing HD viewers and platform operators Ofcom believes that, if the BBC Executive does wish to move to the 1080p format in the future, the Trust should consider carefully whether a further PVT is required. It is important to note that we are not suggesting that a further PVT will definitely be needed – only that the Trust should reserve the right to launch a further PVT if the industry environment at the relevant time suggests that such a process is necessary.
- 3.13 It should be noted that whilst HD has proved popular in the US, the US SD services use a technology and screen resolution which is generally considered to be inferior to that used in the UK. Consequently, consumers in the UK are unlikely to consider the improvement gains from HD (when compared to SD) to be as great as consumers in the US.

HD Production

- 3.14 Producing television programmes in HD not only requires new HD compatible cameras and post production equipment, but also requires changes to the scenery, costumes and make up.
- 3.15 Due to the higher resolution of HD, imperfection in scenery, costume and make up are more likely to be noticed by viewers. Improving the quality of film sets can increase costs due to the increased time required and the need for higher quality materials. Additionally, creative and technical staff may require additional training and develop new techniques to ensure high quality HD productions.
- 3.16 New TV cameras are required to capture HD pictures. Pictures are generally captured at the highest resolution and frame rate possible for the purposes of future-proofing the content archive. The programmes can then be down converted to lower resolution for transmission i.e. 720p, 1080i or even SD. There is already a general shift towards replacing older equipment with HD capable equipment as part of the standard replacement cycle and Ofcom understands that the market is sufficiently mature that the premium for HD compared to SD equipment is already relatively small.
- 3.17 As well as recording new programmes with HD cameras, older film content (e.g. 35mm) can be re-mastered and transferred to HD. Many feature films made before HD was developed are now being transferred to the format. Whilst this approach provides a large archive on which broadcasters can

draw, there is some risk that older master copies will never be able to match the clarity and sharpness of new HD content and may devalue HD in the eyes of consumers.

Digital compression

- 3.18 A very high data rate is required to digitally encode a television service, for example, an uncompressed SD TV signal requires a 270 Megabits per second (Mbps) data stream. In order to distribute the service in a cost effective manner, the digital stream must be compressed to remove redundant information, so that only the minimum data required to recreate the picture within a set top box is sent.
- 3.19 The MPEG2 compression system has been used on all the UK's digital TV platforms since they launched almost 10 years ago. Using MPEG2, the 270Mbps standard definition digital TV signal can be compressed down to around 3Mbps. However, due to the much higher resolution of HD pictures, less compression can be achieved and using MPEG2 HD services require around 18-20Mbps of transmission capacity.
- 3.20 In the last two years, a new, more efficient, compression technology has been introduced, commonly known as MPEG4⁷. Using MPEG4 a HD service can be compressed down to around 15Mbps, and it is hoped that with improvements in encoder design this can be reduced to less than 10Mbps in the next few years.
- 3.21 MPEG4 is not backward compatible with existing set top boxes which contain MPEG2 decoders. Therefore, in order to process services compressed with MPEG4, consumers must purchase a MPEG4 compliant set top box.

Digital Transmission

- 3.22 In addition to compression, a digital transmission system is required to carry a digital data stream on a radio channel. This technology is implemented at the transmitter sites to 'modulate' the digital data onto the radio carrier, and complementary technology is required in the consumer's set top box to extract the digital data from the received radio signal.
- 3.23 The same transmission technologies have been used in the UK for almost 10 years. DVB(Digital Video Broadcasting)-S was developed for satellite, DVB-C for cable and DVB-T for DTT. However, due to technology improvements it is now possible to design and build more efficient transmission systems for a similar cost. An improved transmission standard (DVB-S2) has already been implemented by Sky on satellite, primarily for use with HD services. Work is ongoing to develop a new standard for DTT (DVB-T2, which could enable a 30% minimum improvement in bandwidth efficiency compare to DVB-T), and has just started for a new standard for cable.

HD capacity

- 3.24 The number of TV services that can be carried on a given radio channel (e.g. a satellite transponder or a DTT multiplex) is a function of the level of compression and the efficiency of the transmission system used. Choice of

⁷ The full name is MPEG4 H264 AVC

compression and transmission standards is therefore an important consideration when introducing HD services onto existing digital platforms.

- 3.25 Given the high data rates required to transmit HD services and the importance of choosing appropriate compression and transmission technologies to maximise capacity and minimise costs it is important to consider the approach the BBC proposes to adopt on the different digital platforms.
- 3.26 On satellite the BBC would be responsible for securing sufficient satellite transponder capacity and choosing the compression and transmission technology⁸. On cable, the BBC would need to reach a commercial carriage agreement with Virgin Media, who in turn will need to allocate sufficient capacity on its network and use compression technologies compatible with its HD set top boxes.
- 3.27 The DTT platform is currently more capacity constrained than satellite or cable and as a result the introduction of HD is more complicated. Existing capacity constraints have led the BBC to propose the launch of the four-hour overnight HD service in 2008 with the expectation that consumers would use a digital video recorder to time shift their viewing. However, the BBC has proposed to offer the nine-hour service if sufficient capacity were to become available in the future. The new transmission technology (DVB-T2), which is currently being developed by the DVB standards group, may help to ease some of the capacity constraints on DTT. However this technology is not expected to be commercially available until Summer 2009 at the earliest. Introduction of DVB-T2 on the UK DTT platform has significant implications for the MIA and the PVT, and is considered further in section 4.
- 3.28 The high bit rates currently required to transmit HD services limits the ability for Internet Service Providers (ISPs) to deliver HD over ADSL based broadband connections. Broadband speeds in excess of 10Mbps are currently required to deliver HD in real time and these speeds can only be supported by a small percentage of telephone lines. Alternative solutions are possible, including downloading HD programmes to set top box or PC hard drives at lower bit rates before they are viewed.

Consumer equipment

- 3.29 To display HD signals properly a consumer requires a TV display with a minimum of 720 horizontal lines. Displays that carry the "HDReady" logo are compatible with both 720p and 1080i HD services and are compatible with the BBC's proposed service.
- 3.30 Most integrated digital TVs, even those that carry the HDReady logo, cannot receive HD broadcasts from satellite, cable or DTT without an additional, external set top box carrying the "HDTV" logo. The HDTV logo shows that a set top box can support MPEG2 and MPEG4 compression and the 720p and 1080i HD formats. However, the specification only requires support for DVB-T or DVB-S and DVB-S2 or DVB-C. Currently support for DVB-T2 is not specified (this is primarily because the DVB-T2 specification is not yet ready

⁸ One important consideration for the BBC is that the choice of transmission technologies are compatible with the technologies supported by Sky's HD set top boxes as well as the new HD PSB Freesat boxes.

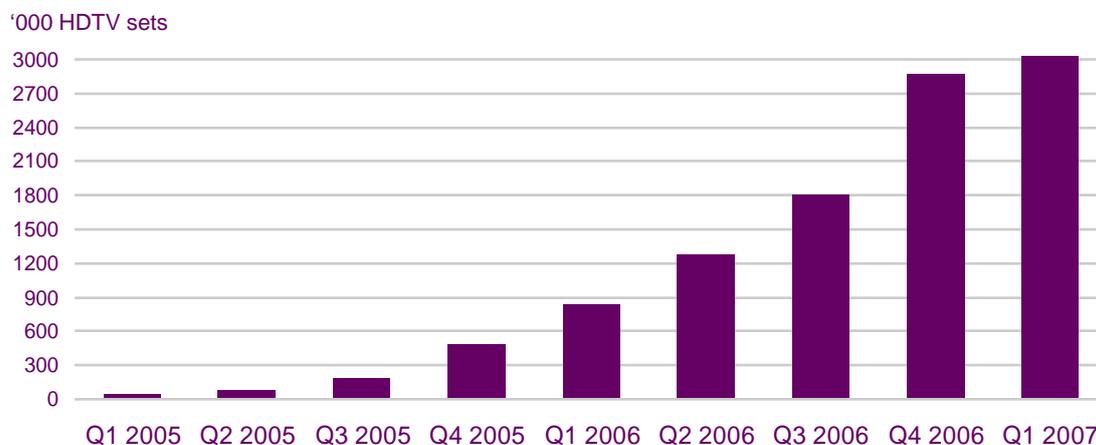
for commercial implementation) and so a set top box carrying the HDTV logo would not be able to receive a HD service broadcast using DVB-T2 transmission technology.

- 3.31 In addition to watching live HD programming consumers may also wish to record it for later viewing. It is not possible to record HD services using a standard VCR (unless the content is first down converted to standard definition). It is expected that the majority of consumers will record programmes using a Personal Video Recorder (PVR) which contains a large computer hard disk. Because of the high bit rate associated with HD programmes larger hard disks than those used in existing standard definition PVRs will be required to store the same number of hours of programming. If consumers want to make permanent copies of programmes writable high definition DVDs (HD-DVD and Blu Ray) can be used, subject to rights restrictions enforced with copy protection technology.

Current provision of HD in the UK

- 3.32 Consumers are rapidly taking up HD-related equipment and services, albeit from a low base. By the end of Q1 2007, 3.15m HD Ready TV sets had been sold in the UK, with 2.3m of those being sold in the preceding 12 months. A total of 7.5m TV sets have been sold in the UK in the past 12 months, so the proportion of these that are HD Ready (2.3m – roughly 30%) is significant. Figure 3.2 below shows HDTV set sales, from GfK research published at the HD Masters 2007 conference.

Figure 3.2: HD-ready TV set sales (cumulative)



Source: GfK

- 3.33 However, although many HD Ready TVs contain integrated digital receivers for SD services, they do not contain the necessary equipment to allow for the reception of HD services. In order to receive HD services on a HD Ready TV, set the consumer will generally be required to purchase (or acquire) an additional HD compatible set top box.
- 3.34 HD services are currently available on the satellite and cable platforms, through subscription services offered by Sky and Virgin Media. The nature of these two pay TV services and their current customer base, are summarised in Figure 3.3 below. It is useful to note here that a Sky subscriber could purchase an HD set top box and, after they have completed their minimum

contract term, could cancel their subscription to the pay HD channels but keep the set top box and still receive the BBC HD trial channel. With Virgin Media, HD content can be accessed via the V+ personal video recorder (PVR). If a Virgin Media customer were to stop subscribing to the V+ service, they would have to change to a basic box and would no longer be able to receive on-demand HD content or the BBC HD trial channel. HD content can also be received via some types of games consoles and via high definition DVDs (if a Blu-Ray or HD-DVD player has been purchased).

Figure 3.3: HD services on satellite and cable platforms

	Sky Digital - SkyHD	Virgin Media - V+
Platform	Digital satellite	Digital cable
Availability	98%	Approx 55%
Minimum subscription	12 months	12 months
Start up costs		
Equipment costs	Sky+ box - £299 (or £399 without HD package)	V+ set-top box - free
Installation cost	£30 (or free with multi-room subscription)	£150
Monthly HD subscription costs (in addition to standard TV package)		
Extra monthly cost	£10	£0-£5 depending on package
HD box features		
HD content available	Sky Sports HD1 and 2, Sky Box Office HD1 and 2, Sky Movies HD1 and 2, Sky One HD, Sky Arts HD, National Geographic HD, Discovery HD, The History Channel HD, BBC HD trial	BBC HD trial, selected on-demand movies and TV (HD movies cost up to £4.50 for 24hr)

Source: BSkyB, Virgin Media

3.35 During the MIA process, we were told that Sky HD is Sky's fastest selling product ever. In Q2 2007, Sky reported that it had 292,000 subscribers to its HD services, with Virgin Media announcing that it had 167,000 V+ subscribers (although V+ customers may have subscribed in order to enjoy the PVR functionality, rather than the HD service). HD subscriber numbers over time are set out in Figure 3.4 below.

Figure 3.4: HD subscribers on satellite and cable platforms (cumulative)

	BSkyB	Virgin Media
Q2 2006	38,000***	34,000*
Q3 2006	96,000	40,000
Q4 2006	184,000	79,000**
Q1 2007	244,000	150,000
Q2 2007	292,000	167,000

* HDTV service launched in old Telewest areas Feb 2006

** HDTV launched in NTL areas and rebranded from NTL:Telewest to Virgin Media during this quarter. HDTV STB rebranded to V+

*** Sky HD service launched 22 May 2006

Source: BSkyB, Virgin Media

- 3.36 There has been limited availability of HD services on the DTT platform. The PSBs operated a small scale closed user group trial in London during 2006/7, but the DTT platform has no permanent HD services. HD services are also not available on broadband TV (IPTV) services operated by BT Vision and Tiscali TV, although IPTV boxes may be HD compatible in some cases.
- 3.37 On the production side, many production and post production companies are switching to HD equipment. There has been some acceleration in production of programming in HD, primarily targeted at sales to international markets.

Forecasts of HD take-up by the BBC Executive and third parties

- 3.38 Although it was launched in the 1980s in Japan and in the late 1990s in the US, HD is a relatively new service in the UK, having only been formally launched on the pay TV platforms last year. We note that there is much debate within the industry about the degree to which HD will replace standard definition broadcasting. This section outlines some of the recent data and forecasts published on this topic.
- 3.39 In a document published in April 2007 about the European Market for HD set top boxes and chipsets, Screen Digest said that "migration to high definition television is an ongoing and inevitable process". It suggested that the necessary conditions are now in place for a "global and sustainable lift off of HDTV":
- HD ready sets are spreading rapidly into households, surfing on the flat TV wave;
 - Standardised technologies throughout the technical chain
 - Enough HD content already available to be broadcast
 - Compression codes such as AVC and VC-1 reducing transmission costs

- All other consumer electronics products migrating to HD quality too (including home video players, games consoles and camcorders), raising consumers' quality expectations
 - Economies of scale through global market for HDTV hardware and content".⁹
- 3.40 In its January 2007 global analysis of HDTV¹⁰, Informa notes that there have been "teething problems" surrounding take off in Europe, as compared to Asia and the USA. They suggest that this "is not due to consumer disinterest but more commonly problems with the supply of reception equipment. In addition, the limited availability of content and the high cost of equipment have also hindered adoption of the technology". Informa also points out that "One contributing factor to more limited European activity is the fact that the European analogue standard offers comparatively better picture quality than the US and other TV markets".
- 3.41 On the other hand, Informa also notes that "within 20-30 years high-definition will likely be the industry's default standard. So, for the entire industry, it is a case of 'when' to invest in HDTV, not 'if'". It also suggests that with "Japan and the US already up and running, Europe is the next great challenge for HDTV, and after a few teething problems, it is now on course to become a prominent feature of the European TV landscape." However, Informa points out that there are "two major factors that could hold back HD in Europe (and elsewhere). While the sale of HD-ready TVs is gathering momentum, there is a lack of critical mass of content to view on them...Mass market HDTV will require a broader range of content to be made available". They add that technology may also limit the speed of deployment and that "HD has remained bandwidth intensive. This has enabled satellite DTH players to take the lead but has restricted the ability of cable and telecom operators to compete."
- 3.42 As part of its application to the BBC Trust to launch an HD service, the BBC Executive commissioned Spectrum Strategy Consultants to consider the potential take-up of a BBC HD channel. This involved providing forecasts of households upgrading to HD over the next few years. The BBC Executive's PVT application suggests that there will be growing demand for HD services in the UK. It notes the growth in pay TV HD subscriptions since the introduction of those services by Sky and Virgin, and further the growth in sales of HD Ready television sets in 2006, pointing out that over five times as many HD-Ready television sets (2.4 million) were sold in the year to December 2006 compared with 2005¹¹.
- 3.43 The BBC Executive believes that this trend in sales will continue as the price of HD equipment declines. The BBC Executive suggests that "Increasing numbers of consumers are viewing SD programmes on relatively expensive, new HD Ready TV sets, with an expectation of improved picture quality... Consumer dissatisfaction could result when SD's inferior picture quality

⁹ 'High Definition set top boxes and chip sets – The European Market' Screen Digest April 2007

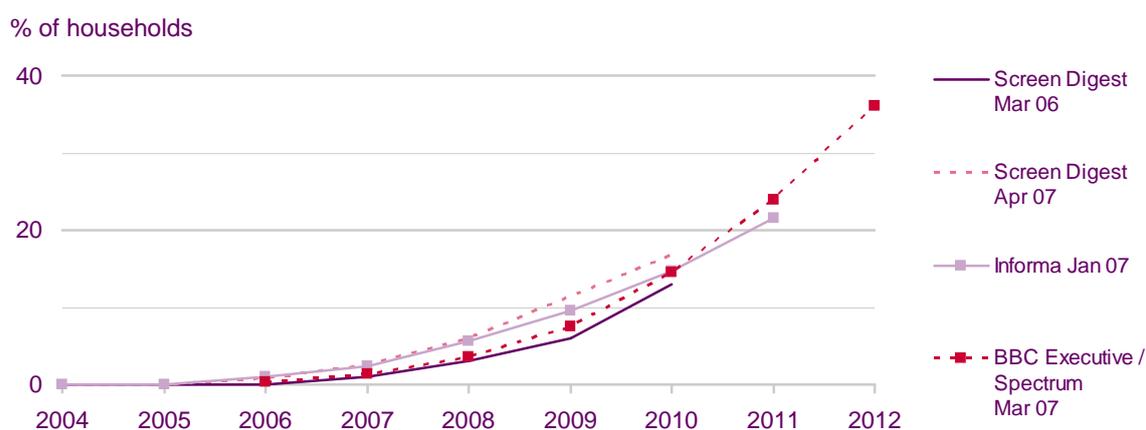
¹⁰ 'HDTV: A Global Analysis (2nd Edition)' – Informa UK January 2007

¹¹ Paragraph 1.2.3 'BBC Management's PVT application for a High Definition Television channel' BBC Management. This particular statistic itself is footnoted as sourced from GfK research - January 2007.

becomes apparent (through lack of detail and crispness) on larger, flat-panel LCD and plasma screens"¹². The BBC Executive also suggests that, by 2010, "11 million UK households should have HD-Ready TV sets and 12% of homes are expected to have subscribed to premium HD services. Key events such as the Beijing Olympics in 2008, the World Cup in 2010 and the London Olympics in 2012 will, if broadcast in HD continue to boost sales".¹³

- 3.44 Figure 3.5 below summarises the forecasts of HD penetration (i.e. the proportion of UK homes with an HD Ready TV set and HD set top box enabling them to receive HD content) discussed above – namely those of Screen Digest, Informa and the BBC Executive / Spectrum.

Figure 3.5: Forecasts of HD penetration as a percentage of all households



Source: Screen Direct, Informa, Spectrum Strategy Consultants; BBC/Spectrum forecasts refer to percentage of TV households; BBC/Spectrum forecasts assume that the nine-hour BBC HD channel launches across satellite, cable and DTT

Views of stakeholders about HD within the UK

- 3.45 As noted in Section 2, Ofcom received several written submissions from – and had further discussions with – interested stakeholders. These submissions and discussions provided useful perspectives on the possible development of HD services within the UK. Due to the fact that some of the responses were confidential, we do not directly attribute comments to individual stakeholders in this document. Rather, and where relevant, we report the broad industry grouping in which the relevant stakeholders could be categorised.
- 3.46 Most stakeholders told us that HD would be the next major change in television technology and pointed out that consumers were increasingly purchasing HD Ready TV sets. For instance, an equipment manufacturer noted that the volumes of HD-ready TV sets sold in the UK indicated that the trend towards HD broadcasting is beneficial to consumers. However, it was also pointed out that the HD market is complex from a technology perspective, and that the organisation was watching developments closely to see how things developed. We were also told that the price of HD set top

¹² Paragraph 2.7.6 'BBC Management's PVT application for a High Definition Television channel' BBC Management.

¹³ Paragraph 2.7.5 'BBC Management's PVT application for a High Definition Television channel' BBC Management.

boxes was falling significantly, and that, by the second half of 2008, there is likely to be less than a 10% difference in cost between an SD STB and an HD STB (standard boxes).

- 3.47 Stakeholders in the production sector and in equipment manufacturing noted that HD is becoming the global standard for television production and broadcast. On the production side, many expressed the view that content production is increasingly moving towards HD – partly due to demand from international markets, and because equipment replacement cycles mean that SD production equipment will become increasingly rare.
- 3.48 The same stakeholders pointed out that consumers are also increasingly accessing HD content through games consoles and on DVD. These stakeholders felt that mass consumer demand for HD is inevitable and with it comes high expectations of quality accessibility and choice. Some of them argued that the UK would lag behind other markets (e.g. the USA and Japan) unless a strong HD proposition is developed, and others noted that US operators such as DirecTV are planning in excess of 100 national channels of HD content.
- 3.49 The UK broadcasters and platform operators generally agreed with these views. They told us that HD represents the next generation of TV broadcasting, and tended to agree with the BBC Executive's broad assumptions about the direction of likely consumer demand for and international supply of HD television. In terms of growth of HD households, one stakeholder told us that – although it is unclear how fast HD will become mainstream – there is no sign that growth will slow. Another projected that the number of HD enabled households will rise from around half a million in 2007 to around five million in 2012 (assuming the launch of a BBC HD channel, and on the assumption that no HD services are launched on DTT).

Defining the scenario without the BBC HD channel

- 3.50 The above discussion has highlighted the significant uncertainty around the future trajectory of HD take-up. This poses challenges for this MIA – as it is difficult to define the counterfactual against which we assess the impact of the proposed BBC service. For Ofcom to analyse the impact of launch we need to compare forecasts of the state of the world with the BBC HD channel, against a counterfactual without a BBC HD channel. This MIA assesses the impact of the BBC service against the counterfactual in which the BBC does not launch the HD channel – but in which other drivers towards HD (including HD production and HD broadcasting by other players) continue to develop.
- 3.51 Making projections always has a number of challenges, but as HD has only recently launched within the UK and is a new technology and service, this is more challenging than usual. However, it is not necessary for Ofcom to devote considerable effort to developing robust projections for the future of HD take-up for the purpose of this MIA. This is because the counterfactual represents a reference case against which we examine the *changes* that might be brought about by the BBC HD channel; the scale of these changes may not be overly sensitive to the precise specification of the counterfactual. For the purposes of this MIA, it has therefore been sufficient to develop a characterisation of the counterfactual case which has been informed by the

BBC Executive's own projections¹⁴, though taking into account of the views of other commentators and stakeholders in the process.

- 3.52 In addition, we have considered the ways in which our assessment might alter in the event that the counterfactual scenario was significantly different to this reference case. In essence, we have focused our analysis around a central scenario which we consider plausible (but which does not represent an Ofcom view of the world), and we have then considered the way in which our assessment of BBC HD channel launch might change under two alternate scenarios.
- 3.53 Very broadly, the three scenarios are: very high demand for HD services; a lower scenario in which demand grows but HD remains a niche proposition; and a central scenario where demand is in the middle of these two extremes. The three scenarios are outlined in Annex 3, and they all specifically exclude the existence of a BBC HD channel. Figure 3.6 below summarises the key characteristics of the scenarios and the differences between them.

¹⁴ It is important to note that the BBC Executive's projections include the BBC HD channel; we have therefore not used the projections directly in order to develop our assumptions for the counterfactual used in this MIA.

Figure 3.6: Illustrative assumptions underlying counterfactual scenarios without the BBC HD channel

Assumption	Lower	Central Scenario	Higher
General demand for high definition services	HD is a niche proposition. 10% of households upgrade to HD by 2012.	HD is popular but not mass market. Around 30% of households upgrade to HD by 2012.	HD is very popular. Over 50% of households upgrade to HD by 2012 – most between 2008 to 2010.
Channel switching	Those upgraded to HD switch for HD versions of SD content. Only minor switching for HD content per se.	HD households switch for HD versions of SD content & of remaining viewing hours – 20% switches to HD content.	HD households switch for HD versions of SD content & of remaining viewing hours – 50% switches to HD content.
HD channels	Pay TV platforms carry non-BBC HD content. No other HD channels launch.	Pay TV platforms carry non-BBC HD content . Free to air HD channel launches in 2008 with PSB Freesat. Further free to air HD channel launch in 2010.	Pay TV platforms carry non-BBC HD content . A number of free to air HD channels launch in late 2008. Other HD channels – some are simulcasts of SD channels but others new channels.
Platforms	PSB Freesat launches in 2008 – no HD channels. IPTV and DTT have no HD channels. Sky maintains current package Virgin carries non-BBC HD content	PSB Freesat launches in 2008 with one free to air HD channel. Further free to air HD channel launch in 2010. DTT capacity carry no HD channels in the absence of BBC launch Sky & Virgin carry free to air HD channels as they roll out. IPTV providers do not attempt HD launch within period due to capacity constraints.	Freesat launches in 2008 with one free to air HD channel. A number of other free to air HD channels launch by end 2012. DTT – expands capacity and carries free to air HD channels from DSO. Sky and Virgin – carry the free to air HD channels plus other commercial HD channels. IPTV – expands capacity to take HD services before end of period. HD channels are subscription to cover cost of capacity expansion.
Analogue customers – upgrade to digital	Most analogue customers upgrade to DTT. HD is not a big rationale for platform choice. Second largest proportion goes to Freesat and pay TV platforms.	Analogue customers mainly upgrade to DTT. Freesat is next popular choice of platform. Others go to pay TV platforms	Analogue customers mainly upgrade to Freesat as it has more HD channels than DTT.
Platform Switching	Only minor switching for HD as demand (value for end consumers) is low.	Platforms with larger HD service offer benefits over those with little or no HD. But costs of switching are weighed up against incremental benefits and switching purely for HD is unlikely to be significant.	Platforms with a more significant HD service will offer much more value to end consumers. Hence switching for HD is more significant. Platforms such as Sky, Freesat and Virgin gain relative to IPTV and DTT.

Section 4

Impact on relevant products and services

Contents of this section

- 4.1 This section reports the main analysis and findings of this MIA. We start by providing an overview of stakeholder views on the possible market impacts of the proposed BBC HD channel. We then move on to a more detailed consideration of the market impacts in each of the following areas, incorporating stakeholder feedback and quantitative analysis where appropriate:
- Platform take-up
 - Broadcast services
 - Content provision
 - HD-related hardware and software
 - On-demand services.
- 4.2 The analysis in this section focuses on the impacts under the central scenario described in Section 3. However, we also consider sensitivity analysis around the higher and lower scenarios, to assess whether our conclusions and recommendations are materially affected by alternative assumptions about market developments.

Overview of stakeholder views

- 4.3 We have placed significant weight on the views expressed by stakeholders, as the stakeholders with whom Ofcom has engaged during this MIA are those that would be expected to experience the market impact of the BBC's proposals. We consider stakeholder views in more detail within each of the five areas listed above, but provide an overview of stakeholder feedback here.
- 4.4 All industry stakeholders were largely supportive of the BBC's proposed HD channel, although they raised some concerns about limited and specific aspects of the BBC's proposals. Stakeholders argued that the channel launch would have some important positive impacts – in terms of promoting the take-up of HD equipment and services, and reducing the costs of HD production in due course.
- 4.5 Broadcasters suggested that the BBC's HD channel may prompt some channel substitution, whereby viewers switch from other commercial channels to the BBC's HD channel – however, the broadcasters felt that this impact would probably not be significant in scale. This modest negative impact could be offset by other impacts. In the case of the retail pay TV providers on the satellite and cable platforms, the BBC HD channel could increase the attractiveness of their HD packages (even though the BBC channel itself would be free to view). In the case of the Public Service Broadcasters (PSBs), the launch of the BBC HD channel on the DTT platform, taken together with the subsequent launch of HD channels by other PSBs on DTT, could help to defend the position of the DTT platform, on which PSBs have a larger share of viewer attention, against competition from satellite and cable platforms. The PSBs linked this defensive rationale with the need for the DTT platform to have capacity to

broadcast a number of HD channels, although in general terms their support for the BBC's HD channel was not conditional on specific actions being taken to create additional DTT capacity for HD.

- 4.6 Representatives of the programme production sectors considered that the BBC HD channel launch would accelerate the shift towards an HD production ecosystem and so improve the scale economics of HD production to the advantage of all. Hardware manufacturers, along with broadcasters, believed that the BBC's proposal would help to move consumers onto MPEG4 boxes, thereby limiting the number of MPEG2 legacy boxes on the DTT platform in light of an anticipated migration to MPEG4 in due course.
- 4.7 IPTV and network providers noted that there could also be capacity problems on IPTV – earlier consumer demand for HD created by the BBC service might create difficulties for IPTV providers, as they currently lack the infrastructure to carry HD services over broadband networks. They suggested that the BBC engages in dialogue before a BBC HD service is launched on internet platforms.
- 4.8 All of the above issues are explored in more detail in the rest of this section.

TV platforms and network services

Potential impacts on platform services

- 4.9 Viewers access TV services on a number of platforms – analogue and digital terrestrial, satellite, cable and IPTV. Given the popularity of the BBC and its strong brand in the UK, the launch of the BBC HD channel is likely to increase consumer knowledge and demand for HD services, and could affect the choices consumers make about the platforms they use to access TV services – both in terms of upgrading from analogue to digital, and potential switching between digital platforms.
- 4.10 These platform choices could raise market impacts in two ways:
- Some consumers may alter their choice of platform, switching from platforms with fewer HD services to those with a relatively larger amount of HD services. This could impact on the relative position of different digital TV platforms
 - Broadcasters have differential viewing shares on different platforms, and so consumers' platform take-up decisions will impact on the position of individual broadcasters in terms of their audience share.
- 4.11 We consider the second impact later in this section, and focus on the platform take-up decision here.

Stakeholder views on platform impacts

- 4.12 Stakeholders identified three main areas of platform impact:
- The relative position of the DTT platform – both in the short term while there is a differential BBC HD service between DTT and other platforms, and in the medium to longer term with this medium to longer term effect depending on whether the DTT version of the BBC HD channel is the full nine-hour version or the four-hour overnight version
 - The impact of the BBC HD channel in helping to drive take-up of PSB Freesat

- The relative position of IPTV platforms, which currently lack the infrastructure to make HD services available to the majority of the population.
- 4.13 The broadcasters noted the risk of DTT platform erosion in the period where the nine-hour service is available on other platforms, but not on DTT. One broadcaster expressed the view that the launch of a full BBC HD channel across satellite and cable, with an apparently weaker overnight offering on DTT, could help build awareness and interest in HD generally, but could also drive the take up of viewing on satellite and cable platforms at the expense of DTT. Similarly, another suggested that a platform with an HD service with a few hours of programmes could not compete effectively with platforms providing several HD channels.
- 4.14 Many broadcasters raised concerns about the DTT platform in the medium to longer term, suggesting that there could be significant risks to the future of the DTT platform if it is perceived to have fallen behind other platforms in terms of HD provision. The same broadcasters noted the issues relevant to Ofcom's Digital Dividend Review (DDR), and argued that the public service broadcasters should be given access to DDR spectrum in order to ensure that HD services are delivered on the DTT platform. These broadcasters noted that the BBC's HD channel, when taken together with the likely response of other PSBs in accelerating their move into HD broadcasting, could help to maintain the DTT platform in the longer-term as long as the DTT platform has sufficient capacity – whether through existing or newly released spectrum – to carry a number of HD services.
- 4.15 However, some other respondents suggested that platform switching is unlikely to be significant. Various respondents noted that the consumer decisions to migrate from free to air TV to pay TV are complex, and it is unlikely that an overnight BBC HD channel on the DTT platform (in contrast with a full service on pay platforms) would have any significant impact on the decision by a consumer to migrate from free to air to subscription television. Some suggested that the short term impact of the BBC launch is unlikely to lead viewers to switch platforms, or to influence the decisions of analogue viewers when switching to digital.
- 4.16 Some broadcasters argued that the BBC HD channel could promote platform competition through encouraging take-up of PSB Freesat which is likely to be less capacity-constrained than DTT (although some stakeholders argued that it would be important that the BBC does not give undue prominence to Freesat when promoting the HD channel). Moreover, broadcasters (along with hardware manufacturers) believe that the BBC's proposal would help to move consumers onto MPEG4 boxes, thereby limiting the number of legacy MPEG2 boxes that would need to be replaced in any future migration to MPEG4.
- 4.17 IPTV and network providers noted the potential capacity issues on internet platforms: streaming HD channels over broadband is not possible on the majority of DSL lines at present, and so IPTV providers would not be able to deliver the BBC HD channel to the majority of their customers. These providers commented that, if the BBC HD channel became a "must have" proposition for consumers, then there is a risk that consumers may switch from IPTV to platforms that can carry more HD channels. In addition, network providers may need to invest in more advanced network infrastructure on a more rapid timetable than would have been the case without BBC entry, in order to handle the additional network traffic that could result from consumers choosing to download BBC HD on-demand content. However, the IPTV service providers that responded did not express significant concerns in this regard.
- 4.18 Other specific issues were raised, including:

- One stakeholder argued that the BBC should not be gifted additional DTT capacity in order to allow it to launch the HD channel, and that if such additional capacity were available then it should be made available to all broadcasters on a competitive basis
- Another suggested that the overnight DTT version of the service should be made available on all platforms, commenting that the overnight version would embody a de facto (limited) preview capability not available on the nine-hour version, as to do otherwise would be to discriminate against the pay platforms.

Assessment of static impacts on platform services

4.19 There could be several static impacts on TV platforms if the BBC launched an HD channel. We consider these impacts in the context of the potential set of HD services available on each platform (which will impact on their relative attractiveness), and which is summarised below in Figure 4.1.

Figure 4.1: HD services available on different platforms in the central scenario

Platform	Central scenario without BBC entry (Assumed services)	Central scenario with BBC HD entry
DTT	No HD channels	Option 1: The overnight BBC HD channel. Option 2: Early on in the MIA period - the overnight BBC HD channel. Later in the period BBC HD channel becomes nine-hour.
Freesat	A number of free to air non-BBC HD channels	A number of free to air non-BBC HD channels plus nine-hour BBC HD channel.
Pay satellite	Various dedicated HD channels: Sky One HD; Sky Arts HD; National Geographic HD; Discovery HD; The History Channel HD; Sky Box Office HD (2 screens); and with the requisite premium channels – Sky Sports HD (2 channels) and Sky Movies HD (2 channels). A number of free to air non-BBC HD channels.	Various dedicated HD channels: Sky One HD; Sky Arts HD; National Geographic HD; Discovery HD; The History Channel HD; Sky Box Office HD (2 screens); and with the requisite premium channels – Sky Sports HD (2 channels) and Sky Movies HD (2 channels). Plus the nine-hour BBC HD channel and a number of other free to air HD channels.
Pay cable	HD on-demand programmes (150 hours of content) A number of free to air non-	HD on-demand programmes (150 hours of content) A number of free to air non-BBC HD

	BBC HD channels	channels The BBC HD channel.
IPTV	No HD service	No HD service

4.20 We have also attempted to quantify the potential scale of the impacts in this area. Given the interplay between the impacts on platforms and broadcast services, we summarise the quantitative analysis after our discussion of broadcast impacts below.

4.21 In our judgement, the most relevant static impacts are likely to be as follows:

- In the short-term, the BBC HD channel launch could increase the number of viewers for the cable and satellite platforms at the expense of the DTT platform, in the period during which there is a differential BBC HD service between DTT and other platforms. For example, it could affect the choice of upgrade path for customers who will have to upgrade from analogue to digital platforms over the next five years. Whilst stakeholders noted this possible impact, they suggested that it may not be significant in the core MIA period to 2012, and so we do not expect material levels of short-term platform switching as a result of BBC HD launch
- If the differential BBC HD service across platforms is sustained, as in DTT Option 1, in which the overnight DTT channel is not replaced by a nine-hour service on DTT, then the longer-term impact on the DTT platform may be somewhat more negative. As noted above, many stakeholders indicated that this could prompt more material switching between DTT and other platforms in the medium to longer-term
- In contrast, if the overnight DTT service is replaced by the nine-hour service under DTT Option 2, then consumers would receive the same BBC HD channel across satellite, cable and DTT, and so the relative position of the DTT platform would not suffer. In addition, when this impact is combined with some of the dynamic impacts considered below (relating to the acceleration of other PSBs' plans for HD channel launch), the overall impact on the DTT platform is likely to be positive. There could also be a further positive impact on the DTT platform under Option 2, as the marginal consumer value of the launch of a nine-hour BBC HD channel on DTT (where there are currently no HD channels, and where consumers are likely to have a higher propensity to consume BBC content) may be higher than the value of the same channel on other platforms which already carry more HD services
- Under both DTT scenarios, there is likely to be some negative impact on IPTV platforms, as there may not be any HD service on IPTV in the immediate future. The IPTV platforms may therefore see a modest decrease in the number of customers, when compared with the central scenario without BBC entry. As noted above, IPTV providers raised some concerns in this area, but did not indicate that the concerns were sufficiently significant to justify blocking the launch of the BBC HD channel
- Overall, there may be some broader positive impacts on other TV platforms. For instance, the BBC HD channel launch could promote take-up of the PSB Freesat platform. In addition, as the BBC HD channel is likely to be a valuable addition to

the HD proposition on pay satellite and cable, the channel launch may help to promote subscriptions to pay HD packages – since viewers will need to subscribe to the HD package in order to receive a set top box capable of receiving HD programmes (although the BBC HD channel would still be free to view, for example if a viewer ceased their HD subscription but kept the HD set top box).

- 4.22 There are therefore likely to be positive impacts on all platforms, except IPTV where HD is unlikely to be available in the near future. On DTT, the positive impact is dependent on Option 2 being viable, i.e. where the BBC HD service switches from a four-hour overnight service to the nine-hour service later in the MIA period. For cable and (non-Freesat) satellite platforms, there could also be a positive incremental impact on HD subscriptions on these platforms.
- 4.23 Turning to the specific issue regarding the overnight service being available on DTT but not on other platforms, we have not been presented with any compelling evidence suggesting that this would give rise to a significant negative market impact. Our analysis of the BBC's application and our discussions with stakeholders suggest that the reach of the overnight service may be relatively low, and that the character of the service is unlikely to lead to consumers switching away from pay TV platforms in order to access the overnight service. For instance, our consumer research into channel switching – discussed further below – suggests that the overnight version of the BBC HD channel is likely to have little or no impact on viewing of other HD channels. We therefore view the BBC Executive's plans for the overnight DTT service as an attempt to work within the constraints of existing DTT capacity, rather than a decision that is likely to have a negative market impact on other digital TV platforms. We note, however, that there may be some additional public value generated by distributing the overnight service across platforms in addition to the nine-hour service – the extent of this public value is a matter for the BBC Trust to consider in the PVA.

Assessment of dynamic impacts on platform services

- 4.24 We have also considered the longer run dynamic impacts of BBC HD entry on platforms and networks involved in supplying TV services to UK customers.
- 4.25 The static impacts suggest that there may be some modest incremental benefits to the pay TV and Freesat platforms from BBC HD launch, but that the position of the DTT platform is more complex. In particular, there are potential issues regarding the position of the DTT platform in the medium to longer term if it is not possible to carry a significant number of HD services on DTT; but the position of DTT is likely to be stronger if it is possible to carry the nine-hour BBC HD channel and other HD channels on DTT. There may also be beneficial dynamic impacts on DTT, relating to the adoption of new technologies for DTT transmission – such as new compression and transmission technologies.
- 4.26 A specific secondary effect of the BBC HD launch on DTT may be that the number of homes that are equipped with an MPEG4 capable DTT set top box will increase faster than if there were no BBC HD service. This will potentially allow the earlier, commercially viable, introduction of MPEG4 SD channels and/or the conversion of MPEG2 channels to MPEG4 - this could increase spectrum efficiency as more channels will be offered in the same bandwidth. We note that any move to MPEG4 would be subject to a separate Ofcom decision-making process. Nonetheless, we note that this could be a positive impact of the BBC HD channel launch, albeit one which has costs attached – in terms of the cost incurred by consumers in upgrading to MPEG4 set top boxes. There are also a number of issues around the impact of

other technology developments on the DTT platform, in particular around the adoption of the DVB-T and DVB-T2 transmission technologies – these are considered further below.

- 4.27 In addition, and as discussed further below in our discussion of impacts on broadcast services, the BBC HD channel launch could have an impact on other broadcasters' plans to launch HD channels across platforms. Our discussions with stakeholders suggested that the BBC HD channel launch is likely to accelerate other broadcasters' plans for HD broadcasting. They noted that this could have a positive impact by helping to maintain the attractiveness of the DTT platform in the longer-term as long as the DTT platform has sufficient capacity, whether on existing multiplexes or through a new multiplex using released DDR spectrum, to carry a number of HD services.
- 4.28 Two arguments made by stakeholders, and noted earlier in this section, also need further consideration:
- One stakeholder argued that the BBC should not be gifted additional DTT capacity in order to allow it to launch the HD channel, and that if such additional capacity were available then it should be made available to all broadcasters on a competitive basis
 - Several stakeholders argued that the broadcasters should be granted access to digital dividend spectrum in order to ensure that several HD services are delivered on the DTT platform.
- 4.29 In our view, these issues are not ones that can be resolved in this MIA – rather, they are of more direct relevance to Ofcom's work on the DDR. Any decisions about the future allocation of the spectrum released at DSO will be made in the context of the DDR, and so we do not draw conclusions on these issues here. However, we note that if the BBC Executive gains access to additional spectrum (through whatever means), then there will be an opportunity cost associated with the use of this additional spectrum. This opportunity cost would need to be taken into account by the BBC Trust in making its decisions about the BBC's activities, as it is a cost that would need to be balanced against the public value of the proposed service.
- 4.30 Our analysis has also highlighted that IPTV may be at a relative disadvantage to other platforms which have sufficient capacity to deliver HD services. The BBC Executive intends to make the HD channel available on IPTV. However, the timing of such launch is uncertain, and may not be feasible until significantly into the future. Nonetheless, as and when the capacity issues are resolved at some future point, the potential negative market impacts described above (arising from the lack of capacity for HD on IPTV platforms) could be alleviated. Although we recognise that a technical solution to this issue may not be forthcoming in the near future, and that its timing is outside of the BBC's control, we recommend that the BBC Trust and BBC Executive engage further with industry stakeholders about the appropriate timetable for delivering HD on IPTV, with the objective of launching the HD channel on IPTV as soon as it is technically and financially feasible to do so.

Implications of technology developments on the DTT platform

- 4.31 The UK DTT platform is currently capacity constrained and, as a result, it is harder to secure sufficient capacity to launch HD services on DTT than on satellite and cable. Ongoing developments in new technologies may go some way to addressing these constraints, but their use and the timing of their introduction have implications for the

BBC's proposed HD service. The potential impact on the markets is considered below and Ofcom suggests that the broader implications should be considered by the Trust in the overall Public Value Test.

DTT Transmission Technologies

- 4.32 The six digital multiplexes that make up the DTT platform currently use a transmission technology called DVB-T. This technology allows the binary data streams associated with the digital TV services to be transmitted via a UHF radio channel. Equipment containing DVB-T technology is installed at each transmitter site and it is also included in every DTT set top box (or iDTV) where it extracts the binary data stream from the received radio signal¹⁵.
- 4.33 One of the key performance characteristics of any transmission technology is its bandwidth efficiency i.e. the maximum reliable bit rate that can be transmitted on a given radio carrier. DVB-T was designed over 10 years ago and allows up to 24Mbps¹⁶ of data to be carried on a 8MHz wide radio carrier. However, since its introduction improvements in silicon chip technology and reducing costs mean that it is now possible to design a new transmission technology which has a higher bandwidth efficiency.
- 4.34 The industry body which designed DVB-T in the 1990s is now working on a new standard called DVB-T2. The commercial requirements against which the technologies are being developed call for a 30% (as a minimum) improvement in bandwidth efficiency compared to DVB-T. Technical work is ongoing, but it is thought that DVB-T2 will be commercially available in the relatively near future, although not before mid 2009.
- 4.35 Due to its increased bandwidth efficiency, DVB-T2 could help ease some of the capacity constraints currently experienced on DTT and thereby make the introduction of HD easier. However, consumers with existing DVB-T set top boxes will not be able to access services transmitted in DVB-T2, although DVB-T2 set top boxes would support reception of services broadcast on multiplexes still using DVB-T. Moreover, the technology is such that a whole multiplex must be converted to DVB-T2 (it is not possible to use a mixture of DVB-T and DVB-T2 on a single multiplex). Introducing DVB-T2 on an existing multiplex therefore requires all the digital TV services currently on that multiplex to be moved to other multiplexes to ensure that consumers with DVB-T receivers can continue to view them. The services on a DVB-T2 enabled multiplex can only be received on set top boxes that support DVB-T2. Given that a new set top box is required to receive DVB-T2 transmissions, there may be some merit in introducing support for the latest compression technologies (e.g. MPEG4) and HD at the same time.
- 4.36 When it developed its service description, the BBC Executive envisaged providing its four-hour DTT service on an existing DVB-T multiplex (multiplex B). However, launching a service on a DVB-T multiplex and with set top boxes which only support DVB-T has implications for (i) the future optimisation of DTT spectrum utilisation, (ii) the introduction of future HD services and (iii) interoperability of consumer equipment. The first two of these points are relevant to this MIA, and whilst the third

¹⁵ It should be noted that transmission technologies are discrete from compression technologies (such as MPEG2 and MPEG4), although there maybe some benefits in introducing them onto a digital TV platform at the same time.

¹⁶ In the UK most multiplexes use DVB-T in a mode where only 18Mbps is carried in each radio channel. This reduction in bit rate allows greater coverage to be achieved from each transmitter.

relates to public value we have set out the issues as we see them below as they have potential implications for market impacts.

Options for addressing technology developments

- 4.37 In the light of the technology developments outlined above, it appears to us that the BBC Executive has three options for taking forward the HD service on DTT:
- Option A: The BBC Executive moves ahead with the current plan – launching the overnight service using DVB-T, and then continuing to roll out the nine-hour service when feasible, using DVB-T
 - Option B: The BBC Executive delays any launch on DTT until DVB-T2 is available, and the service is then launched using DVB-T2
 - Option C: The BBC Executive launches the overnight service using DVB-T, but delays launch of the nine-hour service, until it can be rolled out using DVB-T2.

Consumer issues and market impact

- 4.38 Each of these options has benefits and costs attached to it. In considering these options, it is important to note that the BBC proposes to launch its four-hour DTT service in 2008 using DVB-T technology and consumers will require a set top box that supports HD, MPEG4 and DVB-T to receive it. Set top boxes that contain DVB-T2 are not expected to be commercially available until summer 2009 at the earliest and so, if new HD services are launched on a DVB-T2 equipped multiplex at some point in the future, any consumers who purchased a DTT HD set top box before DVB-T2 was introduced would not be able to receive the new HD services (transmitted over DVB-T2) without first replacing their set top box.
- 4.39 In the light of the above, the main benefit of Option A is that it would enable DTT consumers to access the BBC HD service on the most rapid timetable. However, there is a potential risk of consumer confusion that may result, as consumers who acquire DVB-T set top boxes would not be able to access any future HD services that use DVB-T2. Although the BBC HD service would use DVB-T, other HD providers might use DVB-T2 – as a result, consumers with DVB-T only boxes would continue to be able to access the BBC HD channel (assuming it continued to be transmitted using DVB-T), but would not be able to access other HD services.
- 4.40 The BBC Executive could try to mitigate against this risk by providing consumer information that clearly states that the DVB-T HD set top box may only be able to access the BBC HD channel, and may not be able to receive future HD services on DTT. Nonetheless, in the limit, there is a risk that this could create a degree of consumer resentment, reduce consumer confidence in the market and consequently reduce demand for HD equipment and services. The introduction of the BBC HD channel in this way could therefore have a negative impact on the HD market, and particularly on DTT.
- 4.41 In the longer term, and in addition to the above, the introduction of a BBC HD service on a DVB-T multiplex could hinder the subsequent introduction of a number of other HD services on DTT, because it would prevent the conversion of that multiplex to DVB-T2. This could significantly reduce the long term appeal of the DTT platform relative to other platforms (which are able to carry a number of HD channels).

- 4.42 Option B would be intended to address these issues. One way to avoid any potential consumer confusion would be to delay the launch of the BBC HD service on DTT until DVB-T2 was available and to ensure all DTT HD set top boxes were capable of supporting DVB-T and DVB-T2 (even if the BBC service were using DVB-T for an interim period). This approach might also allow sufficient capacity for a number of HD channels to be launched on DTT in the future – as noted earlier, the increased bandwidth efficiency of DVB-T2 could help ease some of the capacity constraints currently experienced on DTT.
- 4.43 The potential downside of Option B is that it would mean there was no BBC HD channel on DTT for a period, while there were HD services (including the BBC HD channel) on other platforms. This could increase any negative market impact associated with the differential HD service between DTT and other platforms. However, as noted above, many stakeholders did not think that having a four-hour service on DTT whilst other platforms had a nine-hour service would represent a significant disadvantage for DTT in the next 1 to 2 years, as overall demand for HD was likely still to be relatively low in this period. This could mean that a delay in launching any HD services on DTT until DVB-T2 technology is available may not have a significant impact on competition between platforms. Moreover, even if there is some impact, it may be possible to mitigate this if the BBC Trust and BBC Executive provide clear statements regarding the timeframe within which the HD channel would be available on DTT.
- 4.44 Option C could be seen as a compromise between the above approaches – as it would allow the BBC to launch a version of the HD channel on DTT as soon as possible, but would still allow an upgrade path to DVB-T2 (and therefore potentially a path to a greater number of HD services on DTT). However, there remains the risk of consumer confusion – as noted above in relation to Option A. Indeed, this confusion could actually be greater than in Option A. This is because, under Option C, consumers with DVB-T set top boxes would no longer be able to access the BBC HD channel after DVB-T2 became available (since the DVB-T transmission would cease at that point).
- 4.45 We note that the precise choice between the above options is a decision for the BBC Trust. In taking this decision, we recommend that the Trust is particularly careful in balancing the potential public value and market impact considerations associated with each of the above options. Overall, we recommend that the Trust ensures that its decisions take full account of evolving technologies for DTT transmission, and that it ensures that the outcome of the PVT process does not create barriers to the delivery of a number of HD services on the DTT platform.

Impact on broadcast services

Potential impacts on broadcast services

- 4.46 BBC channels are very popular across all TV platforms, and the BBC has strong brand value in the UK. Therefore, the BBC HD channel may attract a significant share of viewing amongst those who have upgraded, or will in future upgrade, to HD. This could create market impacts, as there could be a reduction in the revenues generated by commercial broadcasters from advertising, sponsorship and subscriptions if the BBC HD channel attracts viewers away from commercial channels.
- 4.47 The nature of any static market impact on broadcast services depends on what the viewers of the BBC HD channel would otherwise have been watching:

- If all of the viewing to the BBC HD channel arises from diversion away from existing BBC SD channels, then there is no direct market impact
- However, if BBC HD viewing is not purely diversion away from BBC SD channels, and if overall viewing hours remain the same, then an overall gain in viewer hours by the BBC would, by definition, reduce viewer hours for commercial channels. This creates a direct market impact – if commercial TV viewing falls then the value of TV advertising to advertisers may also fall. This could lead to a reduction in the advertising revenues of the commercial channels
- Alternatively, if the BBC HD channel increases total viewing by increasing demand for TV services in general, then any negative impact of its launch on the commercial channels would be somewhat mitigated
- There is also an indirect potential impact arising from the fact that channel viewing shares differ on different platforms as a result of the different channel line-up. For example, the BBC and other PSB share of viewing on satellite and cable tends to be lower than on DTT and analogue terrestrial TV. If the full version of the BBC HD channel prompts platform switching towards DTT, for instance, we would expect an increase in viewing hours for the PSBs at the expense of pay TV channels¹⁷. Conversely, a differential BBC HD service across platforms could lead to a switch away from DTT to satellite and cable platforms, and could therefore reduce the viewing hours to the PSBs' channels. Similarly, any consumer switching towards or away from subscription platforms could impact on the revenues that broadcasters earn from subscriptions.

4.48 The dynamic market impacts on broadcast services could also be significant. As discussed further below, these mainly relate to the pace at which other (non-BBC) broadcasters decide to launch HD services. If the BBC HD channel launch leads to an acceleration in the rate of launch of HD channels, then this could be an important consideration.

Stakeholder views on broadcast impacts

4.49 In its PVT application, the BBC Executive suggested that most of the viewing of the BBC HD channel would be diversion away from existing BBC SD channels – and so there would be little market impact. Overall, other broadcasters tended to agree with the BBC Executive's position on viewer substitution, particularly in the short term. They told us that the BBC HD channel could gain viewer share from commercial broadcasters in the period before other terrestrial broadcasters launch their own HD services, and that there could be a similar shift in pay TV homes as viewers choose to spend relatively more time watching channels broadcast in HD than in SD. However, one broadcaster also noted that any impact of the BBC HD channel on viewing shares would probably be limited, as, in the early years following channel launch, relatively few people will be able to receive HD; and in later years, as HD enabled households increase, other PSBs will be incentivised to provide HD services.

4.50 One broadcaster raised concerns about the potential indirect impact arising from potential platform switching, noting that the differential service on the DTT platform may prompt switching away from DTT, and thereby lead to audience share erosion

¹⁷ This does not automatically imply an increase in advertising revenues, since advertising rates vary by platform.

across the broadcaster's portfolio of channels. Nonetheless, the same broadcaster told Ofcom that the scale of this impact is unlikely to be large.

- 4.51 While there was general support for the idea that channel substitution may not be significant in the short-term, some broadcasters argued that developments in platform capacity could increase the extent of channel substitution in the longer term. Specifically, it was argued that if the BBC is able to launch the full nine-hour HD service on DTT, but others find that they are unable to do so because of a lack of access to the necessary DTT capacity, then the BBC HD channel could stimulate more material channel substitution on the DTT platform away from commercial SD channels towards the BBC HD channel.
- 4.52 In addition to the above arguments relating to overall viewer substitution, another broadcaster wanted assurance regarding the service description for the BBC HD service – particularly regarding the amount of movies shown on the channel. In the view of this stakeholder, if the BBC were to show significant amounts of films, it could prompt switching to the BBC HD channel away from premium HD services.
- 4.53 Several stakeholders also argued that the BBC's HD channel launch could accelerate the pace at which other broadcasters launch their own HD channels, noting that this impact has both positive and negative dimensions:
- Some noted that, by driving take-up of HD services, the BBC HD channel could drive the incentives of other broadcasters to begin to provide HD services, and could help clarify the business model and commercial logic for such a move.
 - However, some broadcasters also pointed out that this could raise commercial broadcasters' cost bases in the short-term. This is because HD services can be costly, both in respect of programming and broadcast distribution costs, with unclear potential for incremental revenue over and above SD broadcasting.

Evidence from consumer research on broadcast services

- 4.54 The consumer research, carried out by Illuminas for this MIA, provides useful evidence on the above issues. The Illuminas research investigated the viewing habits of households who are currently HD enabled, and found that most subscribers (87%) choose (the trial) BBC HD over BBC1 in the event that a programme is available on both channels. As a result of starting to watch (the trial) BBC HD, subscribers report:
- An overall increase in TV viewing – especially amongst younger/ mid-age and more recent subscribers
 - An increase in viewing of other HD channels
 - A decrease in viewing BBC and non-BBC SD channels.
- 4.55 Illuminas found that for most HD customers questioned, the programme is the main driver of TV viewing, not picture quality. The qualitative research found that:
- The HD channel is preferred and most will always check whether the programme is being shown on an HD channel before they start watching
 - But most will not choose to watch a programme because it is in HD, rather than a programme they like.

4.56 Illuminas also found that most subscribers have decreased their viewing of SD TV channels since getting HD. The main reduction in viewing has been in those channels that are also now available on HD. Overall, the consumer research concluded that, although there is likely to be some switching away from SD channels, the majority of the impact would be on BBC SD channels. This is demonstrated in Figure 4.2 below.

Figure 4.2: Summary of impact on viewing of HDTV and the current and proposed BBC channels

	TV usage before getting HDTV	Current TV usage including all HDTV channels	Predicted TV usage if the nine-hour BBC HD channel is launched	Predicted TV usage if the overnight BBC HD channel is launched
Total hours viewed	23.0	25.6	26.8	26.1
Hours viewed in SD	23.0	17.3	16.6	16.5
Hours viewing BBC SD	8.1	7.0	6.7	6.5
Hours viewing other SD channels	15.0	10.3	9.9	10.0
Hours viewed in HD	0.0	8.3	10.2	9.6
Hours viewing BBC HD	0.0	1.2*	2.3	1.8
Hours viewing other HD channels	0.0	7.1	7.9	7.8

Source: Illuminas; * represents usage of the current BBC HD trial channel

4.57 This suggests that the introduction of the BBC HD channel would have only a modest impact on consumers' viewing choices – it could increase viewing hours overall, and any reduction in viewing of SD channels is likely to be primarily focused on the BBC channels. It is also important to note that, while HD households watch significantly fewer hours of commercial SD channels than non-HD households, most of this impact seems to be due to the take-up of HD services in general – and not due to the BBC HD channel in particular.

4.58 These results should be treated with some caution, given that respondents are reporting their perceptions of their own behaviour, which may differ from their actual behaviour. Further, many current HD subscribers have had HD for less than a year, and can be classed as 'early adopters' – and so their behaviour may not reflect the behaviour of the population as a whole. However, it may be reasonable to assume that early adopters will be more interested in HD services than the population as a whole. If this assumption is accurate, then the modest market impact implied by our consumer research would translate into an even more modest impact amongst the population as a whole.

Assessment of static impacts on broadcast services

4.59 The above evidence suggests that HD enabled viewers are likely to behave in the following ways as a result of the BBC HD channel launching in the central scenario:

- They are likely to primarily switch to watch HD versions of BBC SD content

- They are likely incrementally to increase the share of their overall viewing that goes to HD channels. This is because the BBC HD channel is likely to increase the overall demand and value that viewers place on HD services. Some increase in overall viewing is possible
- The incremental increase in HD viewing is likely to be spread between BBC HD and other HD channels. In the illustrative quantitative analysis discussed below, we assume that the HD channels each gain the same absolute amount of extra viewing.

4.60 These changes in viewing are likely to have the following implications:

- The first of the changes will not have any effect on commercial SD or HD channels – it is purely a substitution in BBC viewing
- The combined effect of the latter two changes could be an incremental decrease in the viewing of commercial SD channels, and as a result an incremental fall in advertising and sponsorship revenues of the SD channels, although this is likely to be modest
- If the BBC HD channel leads to an increase in the number of HD households, compared with the scenario in the absence of BBC HD launch, then there may be some diversion from commercial SD channels to commercial HD channels. However, we would not expect total commercial revenues to change significantly.

4.61 We have also considered the view that channel switching may be more significant in the longer term if the BBC HD channel were the only HD service available on the DTT platform. If these circumstances were to arise, then some stakeholders have argued that they could lead to more material channel substitution on the DTT platform from commercial SD channels to the BBC HD channel. We recognise the merit of this view, but believe that the impact may not be material – the view is not shared by all stakeholders, and it is not consistent with our consumer research finding that programme choice is driven much more by content rather than picture quality. Nonetheless, we note the potential significance of this issue, and reiterate our earlier recommendation that the current PVT process should be concluded in such a way as to ensure that the launch of the BBC HD channel does not create barriers to the delivery of a number of HD services on the DTT platform.

Assessment of dynamic impacts on broadcast services

4.62 An assessment of the longer term dynamic impacts of BBC HD channel launch on wholesale channel provision needs to consider how other broadcasters respond to the launch of the BBC HD channel. It appears that the most likely reaction to the BBC HD launch – and one that was noted by all broadcasters who responded to Ofcom during the MIA process – would be for commercial broadcasters to accelerate the launch of their own HD channels.

4.63 The commercial case for HD channel launch requires that the incremental benefits of upgrade (through increased advertising, sponsorship or subscription revenues) outweigh the incremental costs of upgrade. Channel operators would have to be reasonably convinced that viewers would be attracted to the HD channel, as there can be significant costs to upgrading a channel to HD (for instance in terms of bandwidth requirements, and greater production costs). It is important to note that the HD upgrade decision for a broadcaster may not necessarily be about enhancing absolute returns, but about avoiding or minimising the reduction in profits that might

result if the broadcaster does not launch an HD service. In other words, the HD upgrade decision for a broadcaster could be a defensive move.

- 4.64 The stakeholder views reported earlier tend to support this notion – all stakeholders who expressed a view on this issue agreed that the BBC HD channel launch would accelerate the pace at which others launch HD channels. The launch of the BBC HD channel and the incremental increase in demand for HD services, may increase the benefits of upgrading to HD broadcast within the time period of the MIA. Some commercial SD channels for whom the commercial logic for upgrade would previously have been marginal may now find that the benefits outweigh the costs. By and large, it was suggested that HD channel launch by commercial free to air broadcasters would largely be a defensive move – intended to minimise a reduction in profits, rather than necessarily enhancing returns. In other words, even if revenues are falling, the opportunity cost of not launching an HD channel may be greater than the cost of launching HD.
- 4.65 Ultimately, if the launch of the BBC HD channel changed the upgrade decision for a large number of SD channels, this would (assuming that HD picture quality has an incremental value to consumers over SD picture quality) at face value result in potentially greater benefits to consumers and viewers. However, market impacts are not as straightforward. If platform providers or broadcasters reduce the number of SD channels in order to accommodate more bandwidth-hungry HD channels, then this could reduce channel choice. Whether this were beneficial overall to viewers would depend whether the incremental value of the new HD channels outweighed the value of the channels removed from a platform. However, it seems unlikely that enough SD channels would upgrade purely as a result of BBC HD entry for this to be classed as a potential market impact over the period of the MIA.

Illustrative quantitative analysis of platform and broadcast impacts

- 4.66 Ofcom has carried out some illustrative quantitative analysis of the potential impact of the BBC HD channel on:
- The choice by analogue customers of digital platforms (at DSO)
 - Switching between digital platforms and upgrade to HD
 - Channel switching and consequential impact on advertising revenues.
- 4.67 This analysis has used current data on platform and viewing shares, and projected these forward so as to be broadly representative of the later stages of the MIA period (e.g. 2011 or 2012). It makes the simplifying assumption that all analogue customers have upgraded to digital by this point. It also illustrates the potential scale of the differential effect between the two DTT options (even though this is also based on somewhat simplified assumptions, as the BBC Executive's application envisages that the nine-hour schedule would not be fully available on DTT in Option 2 until after DSO is completed at the end of 2012).
- 4.68 This is only an indicative analysis showing quantitative effects on current platform shares and advertising revenues. The assumptions used for the purpose of this analysis are summarised in Box 4.1 below and are purely illustrative, made in order to indicate the potential scale of impacts – they do not represent Ofcom views about future developments. For illustrative purposes, the assumptions deliberately err in a direction that would tend to increase the scale of the impacts: it is therefore sensible

to interpret the analysis as representing a scale of impact that is unlikely to be exceeded in practice.

Box 4.1: Assumptions underlying illustrative quantitative analysis

The scenario without BBC HD assumes that analogue customers upgrade to digital platforms as follows:

- 85% go to DTT
- 10% go to Freesat
- 3% go to Sky pay satellite
- 2% go to cable

If the BBC HD channel launches then analogue upgrades are assumed to change as follows :

- 80% go to DTT
- 15% go to Freesat
- 3% go to Sky pay satellite
- 2% go to cable

This reflects the fact there will be a differential BBC HD service between DTT and other platforms during the period that analogue households are making upgrade decisions.

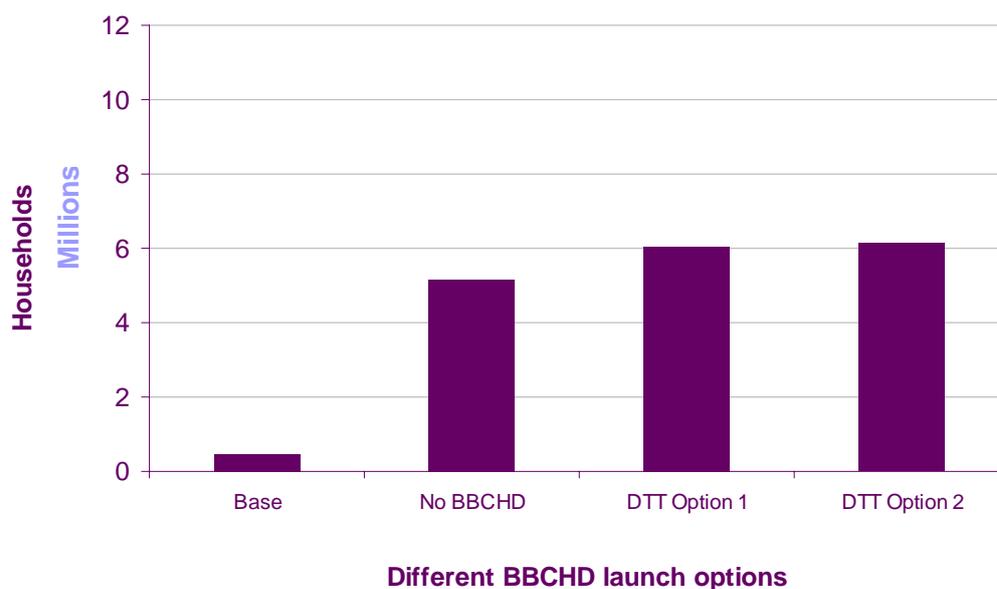
The scenario without BBC HD assumes that demand for HD will continue to increase. DTT is assumed to have no HD channels, so there is no HD upgrade on this platform. There may be some minor switching by SD DTT customers to the pay TV and Freesat platforms. Freesat could have at least one free to air HD channel and 15% of its customers are assumed to upgrade to HD. Sky has its current package of channels (except for the BBC HD trial channel) and Virgin has replaced the BBC HD trial channel with non-BBC HD content. Upgrade to HD is assumed to continue on Virgin and Sky. In this scenario there would be around 5.2 million HD households (in line with the projections of HD take up noted in section 3).

For the scenario in which a BBC HD four-hour service is launched on DTT, but Sky, Virgin and Freesat would have the nine-hour BBC HD service (DTT Option 1), the analysis assumes that there would be no change in behaviour for SD and HD customers on Sky, Virgin and Freesat. However, on DTT the incentive to upgrade to HD would fall considerably. Upgrade to HD is assumed to be only 3%. It was also assumed that there would be a small increase in switching to the platforms which had the nine-hour BBC HD service – though this switching would not be as significant as in the scenario without BBC HD. This scenario would result in around 6.2 million HD households.

For the scenario in which a BBC HD nine-hour service is launched across all platforms (DTT Option 2), this could result in a modest increase in upgrade to HD on the Sky and Virgin platforms relative to the scenario without BBC HD. Slightly more IPTV customers could switch to these platforms given the increase in publicity and demand for HD services engendered by the launch of BBC HD. There is also likely to be an increase in upgrade to HD on the Freesat platform and a small fall in switching to the Sky HD service (the marginal utility of the extra BBC HD channel on Freesat outweighs the marginal utility of the extra BBC HD channel on Sky HD). The most significant impact is likely to be on the DTT platform. As a result of having the nine-hour BBC HD channel, more DTT customers would now see a benefit from upgrading to HD. It is assumed that 10% of households upgrade to HD after the launch of the BBC HD channel. There is also a smaller amount of switching to the pay TV and Freesat platforms compared to the scenario without BBC HD. This scenario would result in around 6.0 million HD households.

4.69 Figure 4.3 below illustrates the implications of the above assumptions in terms of their impact on overall HD upgrade across all platforms. It indicates that the BBC channel might increase the number of HD households by around a million – with the number of HD households being slightly higher in DTT Option 2, in which the nine-hour BBC HD channel is launched across all platforms.

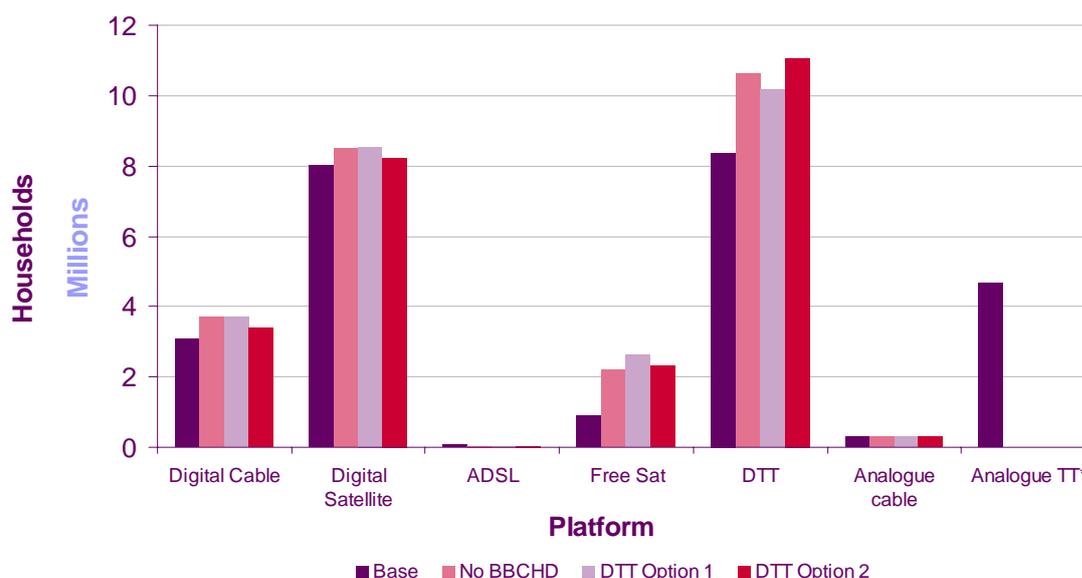
Figure 4.3: Illustrative numbers of HD households



Source: Ofcom analysis; “Base” illustrates current position, and other bars illustrate possible outcomes in the later stages of the MIA period

- 4.70 As can be seen in Figure 4.4 below, launch of the overnight HD channel on DTT and a nine-hour service on Sky, Virgin and Freesat (under DTT Option 1) could lead to a fall in total number of households on the DTT platform and an increase in households on Sky, Virgin and Freesat, when compared to the scenario without BBC HD launch. The Freesat platform is assumed to gain the most from this difference in BBC HD service provision. Freesat could therefore be the greatest beneficiary of increased switching from DTT and could gain a number of analogue customers who decide to upgrade to Freesat rather than DTT.
- 4.71 The effect of the launch of the nine-hour BBC HD channel across all platforms (under DTT Option 2) is also shown in Figure 4.4 below. Compared to the scenario in which a four-hour overnight BBC HD service is launched on DTT, this has a more positive impact on the number of households on the DTT platform – in our illustrative analysis, the number of DTT households under Option 2 is greater than in the scenario without BBC HD launch.

Figure 4.4: Illustrative platform impacts



Source: Ofcom analysis; "Base" illustrates current position, and other bars illustrate possible outcomes in the later stages of the MIA period

- 4.72 In relation to the above figure, it is also important to note that this illustrative analysis suggests the potential for negative impacts on some digital TV platforms as a result of BBC HD launch under DTT Option 2. For instance, if the launch of the nine-hour HD channel across platforms prompts greater take-up of DTT, then this may be at the expense of the satellite and cable platforms. In such a case, and as illustrated in the figure above, the number of satellite and cable households may be lower in DTT Option 2 than would be the case in the absence of BBC HD launch. However, we do not believe this is likely to be a significant issue: the effect may be mitigated through greater upgrade from SD to HD subscription services by existing satellite and cable households. The above analysis is based on higher end assumptions in terms of their effect on switching behaviour, and is intended to illustrate how large the effects might be. Moreover, stakeholders suggested to us that the BBC HD channel would be a valuable addition to platform operators' HD packages.
- 4.73 Finally, we have considered the impact of platform and channel switching on advertising revenues. In addition to the effects of platform switching illustrated above, we have also considered channel switching by HD-enabled customers on the different platforms. This switching has taken into account demand elasticity effects (i.e. if the quantity of commercial viewing falls, the price of advertising could increase as demand for advertising is relatively elastic).
- 4.74 There are two potential effects on advertising revenues, which may offset each other. First, the BBC HD launch may prompt take-up of platforms which have a greater share of commercial viewing, at least for so long as there is a differential BBC HD service as between DTT and other platforms – there could therefore be a positive impact on commercial revenues. Second, there may be viewer switching between channels within each platform – if there is switching from commercial channels to the BBC HD channel, then this would have a negative impact on advertising revenues.
- 4.75 Our analysis suggests that the net impact is likely to be small: for instance, if 2% of commercial viewing switched to the BBC as a result of BBC HD launch, then the total effect would be to reduce advertising revenues by around 0.5%. The reduction in

advertising revenues would only exceed 1% if over 6% of all commercial viewing were diverted to the BBC HD channel. However, switching at these levels seems implausibly high in light of our consumer research, which suggests that switching from commercial channels to the BBC HD channel is unlikely to be significant. As a result, the BBC HD channel seems unlikely to have any significant impact on commercial revenues.

Provision of content – including programme-making and rights exploitation

- 4.76 Stakeholders in the production sector and in equipment manufacturing noted that HD is becoming the global standard for television production and broadcast. On the production side, many expressed the view that content production is increasingly moving towards HD. This is partly due to demand from international markets including co-production with overseas broadcasters, together with a desire to future-proof the archive (i.e. programmes broadcast now in SD may be produced in HD so that they can be re-broadcast in HD in future). This is also likely because of the effect of equipment replacement cycles, in which new SD production equipment is increasingly rare. Stakeholders also noted that, although HD production currently costs more than SD production, this cost differential is already declining – and in the medium term HD production is unlikely to be much more expensive than SD production.
- 4.77 These views suggest that the production sector is increasingly shifting towards HD. Nonetheless, because the BBC is one of the major sources of demand for original content, the BBC HD channel could have a small incremental impact on the demand for HD programming produced for domestic purposes in the short to medium term.
- 4.78 All stakeholders who commented on the issue believed that the launch of a BBC HD channel would have beneficial impacts on the production and programme making sector. One broadcaster suggested that the BBC's support for HD can help to stimulate the migration of the production market to HD, bringing down the production costs for other broadcasters. Another broadcaster also expressed the view that the BBC HD channel will prompt increased demand for UK programme production in HD, but that this process may only be gradual.
- 4.79 Similarly, stakeholders in the production sector suggested that an increase in HD commissions by the BBC should lead to an increase in domestic HD production. These stakeholders expect this move to build confidence in the market, thereby prompting UK facility companies to continue to invest to strengthen the HD service infrastructure and widen the HD skill-base.
- 4.80 Overall, the increase in demand prompted by BBC HD launch and the consequent increase in volumes produced in HD are likely to help drive down the costs of production through economies to scale – but this effect will only be minor, as the demand increment is likely to be small, and the cost differential is in any case expected to decline naturally.
- 4.81 Finally, if the HD launch prompts the BBC to acquire more events rights – in order to be able to carry more high-profile events in HD – then this could prompt an increase in the price of those rights, both for the BBC and for commercial broadcasters. Stakeholders did not raise concerns about event rights during this MIA process, and so we do not believe that there are significant issues here. Further, there is unlikely to be any market impact here, as long as the BBC Executive adheres to the service description – which requires that 95 per cent or more of the HD channel schedule would be HD versions of programmes broadcast in SD on other BBC channels. As

such, the events broadcast on the HD channel would be common to other BBC channels, and the BBC's bidding for events rights should not be any higher than would have been the case in the absence of HD channel launch.

- 4.82 Nonetheless, we recommend that the BBC Trust continues to monitor the BBC Executive's activities in bidding for events rights, so as to ensure that the BBC does adhere to the service description.

Hardware and software including television reception equipment, recording and playback equipment, and physical media

- 4.83 As noted above in our discussion of platform services, the BBC HD channel launch is likely to increase take-up of HD services relative to the scenario without a BBC HD channel. This is also likely to have a positive impact on the take up of HD-related equipment – most notably HD set top boxes, satellite dishes and other reception equipment. As noted above in our illustrative quantitative analysis, the launch of the BBC HD channel could increase the number of HD households by around one million over the next few years – this would go hand in hand with a material increase in the take-up of HD set top boxes. There is less likely to be any material impact on the take-up of HD Ready TV sets, as there is a general consumer shift towards HD Ready displays in any case (although it is possible that some consumers might replace their old TV with a new HD Ready display earlier than they would otherwise have done).
- 4.84 In other words, demand for these products will increase relative to the scenario in which the BBC HD channel did not enter (in economic terms, this means that the demand curve for these products will shift outwards). Such an increase in demand may bring about some increase in consumer surplus, but it does not appear likely to have a significant or sustained effect on the level of producer surplus in the relevant hardware and software markets – since the markets are global and characterised by relatively intense competition. Therefore, while there is likely to be some market impact here, producers in the market are likely to be able to shift rapidly to meet increased demand.
- 4.85 We did not receive any submissions from stakeholders in the consumer electronics retailing industry, and so do not consider there to be any significant issues here. Nonetheless, a similar consideration to the above is likely to be relevant for retailers of HD equipment; they can expect to see increased sales of HD equipment, although this will substitute in part for sales of SD equipment.

On-demand services

- 4.86 If the launch of the BBC HD channel increases linear viewing relative to the central scenario without the BBC HD channel, then there may be some negative impact (reduction in producer surplus) for providers of on-demand services. It is also possible that the four-hour overnight service on DTT could increase PVR use by DTT customers, who may as a result record more 'free' content in place of accessing paid for on-demand content elsewhere. We have, however, not had such concerns raised to us by on-demand suppliers, and so we consider that these impacts are unlikely to be material.
- 4.87 It is also possible that the BBC HD channel may, if it becomes 'must have' content, create costs for ISPs through internet capacity requirements. This would result if BBC HD content were provided through iPlayer. In the MIA of the BBC's on-demand proposals, we noted that internet service providers (ISPs) are likely to need to invest

in greater broadband capacity, as a result of consumer demand for on-demand content delivered via broadband internet. We argued that this would impose resource costs that were relevant to the PVT process.

- 4.88 These costs are also relevant to the current PVT process in two potential ways. First, demand for downloading HD content is likely to impose greater costs on ISPs than downloading the same programme in SD, and / or it could lead to a deterioration in the quality of service experienced by users; this represents a resource cost which should be taken into account in the PVT assessment. Second, if ISPs were to seek to recover increased infrastructure costs from the BBC in return for quality of service guarantees, then there may be a direct financial cost to the BBC in the future.
- 4.89 In terms of the scale of these costs, the cost per HD programme hour downloaded is likely to be higher than for SD content, due to the larger data volumes associated with HD content. However, by comparison with SD downloads via iPlayer, we would expect volumes – at least for the period covered by this MIA – to be considerably lower. Moreover, the majority of HD content that is downloaded is likely to substitute for SD content, further mitigating the overall effect. Nonetheless, we recommend that the BBC Trust gives consideration to this issue when balancing the public value with the costs imposed by the service.

Sensitivity analysis of market impacts

- 4.90 The above analysis related to our assessment of the market impacts under the central scenario for the evolution of the HD market in UK. We have considered the extent to which this assessment might alter under either of the alternate scenarios – relating to higher HD demand and to lower HD demand.
- 4.91 The higher HD scenario assumes that there would be a much higher underlying demand for HD services, even in the absence of the BBC launch. However, launch of the BBC HD channel could still have an impact on demand for HD services, given the BBC's strong brand in the UK and its strong position on the DTT platform. The main difference to the central scenario relate to the platform impacts:
- If the DTT platform has the capacity to carry HD services then we would expect the advent of mass market HD demand to have relatively limited implications for the relative positions of different TV platforms. It would nonetheless be reasonable to anticipate a modest increase in demand for the satellite and cable platforms under this High HD scenario as these platforms will always have a greater capacity than DTT to deliver HD services. However, if the DTT platform were unable to carry a number of HD services, then there could be a much more material migration away from DTT and towards satellite (both Sky and Freesat) and cable platforms over time
 - In these circumstances, if the BBC were only able to provide the four-hour overnight DTT option for the BBC HD channel, then the launch of the BBC HD channel would have little ability to impact the evolving patterns of platform choice. But this option would only come about because of a shortage of capacity on DTT for HD and it would be this shortage, rather than the presence or absence of a BBC HD channel per se, that would be the main factor affecting platform choice. In other words, the market impact of the BBC HD service itself would be small; the much larger set of issues would relate to those surrounding DTT capacity, which are not the subject of this MIA

- However, if the DTT platform has the capacity to accommodate the full nine-hour BBC HD channel then the decision on whether or not to permit the launch of the BBC HD channel would be much more significant. Given the important role played by the BBC position on the DTT platform, the decision to launch an HD channel, including a full HD channel on DTT, could be expected to play a significant role in defending the relative position of the DTT platform. This could enhance the positive market impact of the BBC's HD channel as compared with the central scenario
- We would also anticipate some equivalent considerations to apply to the competitive position of IPTV. For as long as IPTV service providers face material constraints on the capacity of their infrastructure to carry HD programming, then the availability of the BBC HD channel on other platforms can be expected to have an adverse impact on IPTV's platform share. But the main consideration for IPTV service providers in the High HD scenario would be about how to increase the capacity of their infrastructure to carry HD programming in general.

4.92 Turning to other areas of potential impact in the High HD scenario:

- Where channel viewing is concerned, commercial channels (SD & HD) would probably get incrementally *less viewing than if BBC HD had not entered*. Viewers who would have preferred to watch BBC in HD, but have been watching other HD services, could come back to the BBC. Therefore, there could be incrementally lower advertising revenues for those commercial HD channels. Similarly, there could be some additional switching for HD content on the BBC HD channel, i.e. from commercial SD services to BBC HD – though this is likely to be less significant than the switching from commercial HD channels
- At the same time, broadcasters may have a greater incentive to upgrade SD channels to HD, given that the BBC HD launch is likely to stimulate further customers to upgrade to an HD platform, and stimulate switching in viewing from SD to HD programmes
- The incremental positive impacts on HD production and equipment take-up would probably be smaller than in the central scenario, as – under the higher scenario – more of the investment in HD production and equipment would happen even in the absence of the BBC HD channel.

4.93 Under the lower HD scenario, HD would be a niche proposition and there would be a much lower underlying demand for HD services over the period to 2012. In general, we would expect the market impact of the BBC HD channel to be less than under the central scenario although it could still have a small impact on demand for HD services as follows:

- A small incremental increase in demand for platforms which have relatively more HD services and a modest incremental increase in HD upgrade. This would primarily benefit the subscription satellite and cable services as, in the low demand scenario, these are the platforms which have some type of HD service. However, most of the effect in the low HD demand scenario would probably be in relation to upgrade rather than platform switching. As demand is generally low for these services, it is unlikely that the incremental effect of the BBC entry would result in very many marginal customers having a net benefit to switching platform. The platform impacts are therefore likely to be less significant than under the central scenario

- Where channel switching is concerned, in the lower scenario, most channel viewing is generally related to content not quality of picture and the entry of the BBC HD channel is not likely to affect this significantly. Given the relatively small numbers who are HD enabled (even after the BBC HD channel stimulates demand for HD) and low levels of switching away from commercial channels for BBC HD content, there is likely to be only a very small negative impact on commercial channel viewing and revenues
- There could be some positive impacts on HD production and equipment take-up. The incremental effect may actually be larger than in the central scenario, as there would be relatively less HD production and equipment take-up in the absence of the BBC launch. After BBC launch, even though the end position would be characterised by lower take-up than the central scenario, the positive incremental impact of BBC entry may therefore be more significant than under the central scenario.

Summary of market impacts

4.94 Our assessment is that the market impacts of the BBC HD TV channel are likely to be relatively modest in scale and that they will, on overall balance, be positive. In summary:

- Some channel switching is possible from commercial services to the BBC HD channel, but this is not considered sufficiently important to warrant significant modifications to the service. We do, however, note the possible risk of greater channel switching if the BBC Executive diverts from the service description – this leads to the recommendation set out in Section 5 below
- The impact on platforms will be mixed. There should be a positive impact on HD-take up across platforms, including increased take-up of HD subscription services on satellite and cable platforms. The medium-to-longer term impact on the relative position of the DTT platform against cable and satellite platforms depends on whether the nine-hour service is launched on DTT in due course – if it is (under DTT Option 2), then it is likely that the BBC HD TV channel, when taken together with the potential acceleration of HD channel launch by other broadcasters over DTT, will help to maintain the position of the DTT platform. However, there may be a modest negative impact on the relative position of the DTT platform under DTT Option 1 (where the overnight service is not replaced by a nine-hour service on DTT). We would also expect the BBC HD channel launch to have a positive impact on take-up of the Freesat platform (which could potentially be material in proportion to the size of the Freesat platform itself), but to have a small but negative impact on IPTV platforms
- The launch of the HD channel on the DTT platform raises a number of issues around the choice of transmission technology. For instance, the DVB-T2 transmission technology – which is likely to become available in the next few years – could help to ease some of the capacity constraints on DTT. In the light of the possible introduction of DVB-T2, the BBC Trust should consider whether there is a need to amend the BBC Executive's plans for the HD channel on DTT
- Some positive impact is possible in content provision, particularly by reducing the costs of HD production. However, any impact here is likely to be modest. There may be some concerns around events rights if the BBC diverts from the service description – we note our recommendation on this issue in the next section

- Take-up of HD services and equipment may have positive impacts on producers and retailers of such equipment, although these impacts are unlikely to bring about a change in their producer surplus beyond the short term
- The launch of the BBC HD channel is unlikely to have significant impacts on the suppliers of on-demand content, but more significant impacts are possible on ISPs due to the possible need to invest in additional broadband capacity.

4.95 The above observations relate to our assessment of the market impacts under the central scenario for the evolution of the HD market in UK. There may be some differences in the scale of the impacts of BBC HD launch under the alternate scenarios relating to higher HD demand and to lower HD demand. However, these differences would not lead to any changes to our conclusions. Our resulting recommendations, which include proposed modifications to the service, are set out in the next section.

Section 5

Recommendations and proposed modifications

5.1 This final section briefly summarises the main recommendations and proposed modifications arising from our work.

BBC HD channel on the DTT platform

5.2 This MIA has found that the proposed BBC HD channel is expected to have a number of positive market impacts by enhancing consumer value through the delivery of HD services across platforms. However, we have also noted that the launch of a BBC HD service cannot be considered in isolation of the wider discussions taking place in the industry about the future of HD on DTT – in particular about whether future technological developments, including the development of the DVB-T2 transmission technology, will enable the delivery of a number of HD channels on the DTT platform.

5.3 We have noted in this regard that some of the potential negative market impacts associated with the launch of the BBC HD channel may be more significant if the BBC's HD channel is the only HD channel on the DTT platform. Moreover, we have also found that some potential outcomes of the PVT process could create barriers to the delivery of a number of HD channels on DTT – if, for instance, the BBC launch were implemented in such a way that holds back the use of new transmission technologies on the DTT platform.

5.4 We therefore recommend that the BBC Trust ensures that the launch of any BBC HD channel on DTT is considered in the context of the potential delivery of a wider range of HD services on DTT. In particular, we consider it essential that the BBC HD channel is launched in such a way that it does not create barriers to the delivery of a number of HD services on the DTT platform.

BBC HD channel on the IPTV and open internet platforms

5.5 Our analysis for this MIA has found that the launch of the BBC HD channel may create a negative impact on the position of IPTV platforms, relative to other digital TV platforms. This is because constraints on broadband infrastructure mean that IPTV providers may not have sufficient capacity to deliver HD services to a significant number of consumers. While the BBC Executive intends to make the HD channel available on IPTV, the timing of such launch is uncertain and may not be feasible until significantly into the future.

5.6 Nonetheless, as and when the capacity issues are resolved at some future point, the potential negative market impacts described above could be alleviated. Although we recognise that a solution to this issue is unlikely to be forthcoming in the near future, we recommend that the BBC Trust and BBC Executive engage further with industry stakeholders about the appropriate timetable for delivering HD on IPTV, with the objective of launching the HD channel on IPTV as soon as it is technically feasible to do so. This could be formalised by including a requirement in the HD channel service licence requiring the BBC Executive to deliver a version of the channel on IPTV, subject to technical feasibility. This should also be subject to agreement with IPTV

service providers, and subject to the PVT assessment taking appropriate account of resource costs of additional infrastructure.

- 5.7 A separate issue arises in relation to the delivery of HD content via internet on-demand services (e.g. the BBC's iPlayer) – this may create costs for ISPs through internet capacity requirements. We believe that the BBC Trust should take into account the costs arising in this area – if they are likely to be significant, they may offset the public value generated by the service.

Wider technology issues

- 5.8 As noted earlier in this document, the emerging 1080p HD standard is not compatible with existing HD displays and set top boxes, and its introduction would therefore have implications for existing HD customers and platform operators. The BBC Executive has not proposed to use 1080p for its HD channel and Ofcom has therefore not considered the impact of the BBC moving to 1080p as part of this MIA.
- 5.9 However, due to the potentially significant impact that such a move may have on existing HD viewers and platform operators, Ofcom believes that, if the BBC Executive does wish to move to the 1080p format in the future, the Trust should consider carefully whether a further PVT would be required. It is important to note that we are not suggesting that a further PVT will definitely be needed – only that the Trust should reserve the right to launch a further PVT if the industry environment at the relevant time suggests that such a process is necessary.

Service licence and wider regulation of the BBC HD channel

- 5.10 Although most stakeholders suggested that the BBC HD channel is not likely to lead to significant viewer substitution away from commercial channels, we did identify a risk that viewer substitution may be more significant if the BBC HD channel moves away from a mixed-genre service. For instance, the market impact may be greater if the channel were to show many movies in HD. As a result, and in order to minimise the risk of greater impact here, we recommend that the BBC Trust should ensure that the service licence for the BBC HD channel holds the BBC Executive to the mixed-genre service description. If the BBC has greater flexibility in this area, then the market impacts may become more significant.
- 5.11 We also noted earlier that the BBC HD channel is unlikely to have a significant impact on competition for events rights, as the events broadcast on the HD channel will be the same as those broadcast on the BBC's existing SD channels. However, we recommend that the BBC Trust continues to monitor the BBC Executive's activities in bidding for events rights – so as to ensure that the BBC adheres to the service description in this area. If the BBC Executive seeks to acquire more events rights than it would have done in the absence of HD channel launch, then the market impacts would most likely increase.

Annex 1

Joint BBC Trust/Ofcom description of service

Purpose of this document

- A1.1 This document¹⁸ has been drafted by the BBC Trust and Ofcom. It is intended to outline our joint understanding of the BBC's proposals for a high definition television channel and to give clarity on the terms and scope of the proposal that will be assessed by the Trust during the Public Value Test (PVT). The PVT comprises two elements – a Public Value Assessment (PVA), carried out by the BBC Trust, and a Market Impact Assessment (MIA), carried out by Ofcom.
- A1.2 We have clarified certain details contained in the BBC Executive's PVT application. For the avoidance of doubt, we have agreed with the Executive that the description contained here supersedes the description of the proposed HD channel provided in section 3 of the Executive's application.
- A1.3 The details provided here are intended as a guide to the nature of the proposed service for the purposes of the PVT. These should not prejudice any eventual Service Licence.

Proposition

- A1.4 The BBC Executive is applying for permission to provide a single, linear, digital TV channel in high definition (HD) format.
- A1.5 It would be a mixed-genre channel, drawing from content across the BBC's channels, and would aim to meet the BBC's public purposes. The channel would be available free-to-view, and would carry no advertising.
- A1.6 The BBC is seeking approval to provide a service of nine hours per day, 15:00 to midnight, with some flexibility to extend beyond this to allow for the coverage of significant live sport or other events. At launch, the channel would offer a schedule of three to four hours per day, building to nine hours in late 2008.
- A1.7 The intention is to make the HD channel available on digital satellite, digital cable and digital terrestrial television. The BBC may also make the channel, or content from it, available on the internet, subject to value for money considerations and as technology allows. This could be through both bbc.co.uk and internet protocol TV providers.
- A1.8 The BBC Executive has identified two mutually exclusive options for digital terrestrial television (DTT): the full nine-hour schedule or a four-hour schedule overnight between 0200 and 0600.
- A1.9 The full nine-hour schedule would be offered on DTT if sufficient spectrum capacity were available after digital switchover.

¹⁸ This document was agreed by the BBC Trust and Ofcom, and published by the BBC Trust in May 2007. It is reproduced here for ease of reference. The paragraph numbers in this Annex differ from those in the document originally published by the Trust.

- A1.10 The four-hour overnight schedule would be offered ahead of digital switchover and possibly after switchover if insufficient spectrum capacity were available during the transmission hours of the nine-hour schedule. However, it is also possible that the BBC Executive may review its options for providing HD on DTT if sufficient spectrum were not available after switchover.
- A1.11 The four-hour overnight schedule would offer selected highlights from the following day's nine-hour schedule on cable and satellite. In order to provide capacity for this at launch, the BBC Executive proposes to take down the following services from Freeview between the hours of 0200 and 0600:
- BBC Four until close-down;
 - BBC Parliament, when broadcast;
 - two BBCi interactive video streams (accessed through the red button on remote controls);
 - the BBCi interactive news loop (also accessed through the red button – for the avoidance of doubt, BBC News 24 would not be affected).
- A1.12 These changes would be subject not only to PVT approval by the BBC Trust but also to a separate Ofcom process. The DTT multiplex on which the BBC transmits the channels is licensed by Ofcom, so an application to Ofcom for a variation of the multiplex licence would be required.
- A1.13 Under the option where sufficient spectrum capacity becomes available following digital switchover, the four-hour overnight schedule on DTT would be replaced by the same nine-hour service as provided over the cable and satellite platforms. This would happen as digital switchover proceeds region by region. Full national coverage would be achieved on completion of digital switchover in 2012.

Platform

- A1.14 The BBC Executive wishes to make the new HDTV channel available on as many digital television platforms as is feasible. These are expected to include satellite, cable, DTT and (as technology allows) IPTV. It is unlikely to be practicable to offer the channel over mobile phone networks.
- A1.15 Any commercial agreements covering such arrangements would be subject to objective, proportionate and non-discriminatory criteria. The BBC Executive would also be guided by the requirements of the BBC's public purposes – for example, to ensure that the BBC maximises reach and provides a sufficiently high quality offering
- A1.16 If the proposition were to be approved by the BBC Trust, the timescales for offering the channel on different platforms would be broadly as follows:
- Sky and digital cable – from the PVT decision, converting the existing trial into an ongoing service. The PVT decision is expected by November 2007;
 - Freesat – from platform launch, anticipated in 2008;
 - DTT – from mid-2008.

- A1.17 The satellite channel would be transmitted unencrypted, so it would be available free and without subscription through Sky's free satellite service as well as through Freesat.
- A1.18 In principle, the BBC Executive is prepared to make the service available through internet protocol TV providers. Examples of internet protocol TV providers include BT Vision or Homechoice. The timing of launch of the service on such platforms would be dependent on external factors (e.g. developments in broadband access infrastructure), and cannot be predicted at this time.
- A1.19 The BBC Executive may also offer the channel on the open internet through bbc.co.uk, if and when there is judged to be sufficient audience demand and it is technically feasible to do so. This would be through the BBC iPlayer and could entail both live simulcast streaming of the channel as well as offering downloads and/or streams of HD programmes for catch-up viewing on-demand. Programmes offered for catch-up would be subject to the same time-based restrictions on viewing as have recently been approved for the BBC's forthcoming on-demand offerings.

Content

- A1.20 The BBC HD channel would be a mixed-genre service. Its aim, as far as possible, would be to showcase programmes produced in HD from the schedules of other BBC channels. These would be produced in HD end-to-end, not converted from standard definition (SD). Any individual programme may contain up to 25 per cent of non-HD material converted from SD – for example, archive shots in a documentary.
- A1.21 95 per cent or more of the content would be HD versions of programmes broadcast in SD on other BBC channels.
- A1.22 Up to 5 per cent of the content could be programming commissioned for the channel itself. This would largely comprise short items repurposed from existing series, such as are commonly used to fill gaps between programmes.
- A1.23 The content mix would change over time, as more HD content became available. At launch, the mix would reflect the BBC programming that is currently available in HD. These would typically be high impact programmes in genres that particularly benefit from the HD format – mainly factual (such as natural history) and drama plus some arts and music, children's, factual entertainment and live events and sport.
- A1.24 As more HD content becomes available, the content mix would become more representative of BBC television as a whole – including programmes that reach large audiences, such as *EastEnders*, *Casualty* and *Holby City*.
- A1.25 By the time the full nine-hour schedule is achieved, content would come from across the BBC's portfolio of television channels. Approximately half the content would come from BBC One, 30 per cent from BBC Two and the rest from BBC Three, BBC Four, CBBC and CBeebies. The aim is for the bulk of the peak time schedule to be simulcast BBC One programmes. Programmes from BBC Two would be simulcast where the schedule allows. Except in the case of the four-hour overnight schedule on DTT (which would preview the following evening's output on other channels), programmes would not be shown on the HD channel before their transmission on the originating channel.

- A1.26 First-run showings of sport and acquired film would generally not exceed 20 per cent of the content. Repeat showings of sport and acquired film would be limited to occasional narrative or archive repeats of, for example, major sporting events. In years when there are big, infrequently occurring international tournaments (including the Olympics or the World Cup but not annual events such as Wimbledon) the 20 per cent threshold may be breached. On average, this could be expected to happen every other year.
- A1.27 No sports content or films would be acquired solely for broadcast on the channel. While the channel would show mainly UK-produced programmes, acquired films could come from overseas.
- A1.28 As the channel evolves, about 30 per cent of the content would be repeats. These would be either archive repeats or narrative repeats. Archive repeats are programmes drawn from the archives, which for HD productions do not go back many years. Narrative repeats are programmes that would be shown several times for catch-up viewing in the period immediately after initial transmission. As the volume of available HD programming increases, the proportion of archive and narrative repeats could be expected to reduce.

Schedule

- A1.29 From launch, the service would be offered for three to four hours a day. This would build to nine hours (15:00 to midnight) by the end of 2008. Indicative schedules are shown below.

Proposed BBC HD channel: Indicative four-hour weekday schedule for 2007/08

	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
1900	Family Comedy	Lifestyle/Leisure			Children's
1930		Family Drama			
2000	Factual				
2030					
2100	Post-watershed Drama				Comedy
2130					Film/Acquisition
2200	Landmark Factual		Music/Arts	Comedy	
2230	Archive				

Proposed BBC HD channel: Indicative nine-hour weekday schedule, 2009

(R = repeat; S/C = simulcast)

Time	Channel	Monday	Tuesday	Wednesday	Thursday	Friday
1500 1530	Children's Children's	Best of CBBC Children's Drama and Factual				
1600	BBC TWO	Best of Pre-watershed Factual e.g. Coast, Who Do You Think You Are			Archive/catch-up	
1630	BBC TWO			Palin	Dragons' Den	
1700	BBC TWO	Best of Lifestyle/Leisure e.g. Holiday, Rick Stein Food, Gardeners' World			Archive/catch-up	
1730	BBC TWO				Top Gear	
1800	BBC ONE/ TWO	Pre-watershed Drama and Comedy			Archive/catch-up	
1830	BBC ONE/ TWO	e.g. Robin Hood, Holby, Judge John Deed				
1900	BBC ONE	One Show	One Show	One Show	One Show	One Show
1930	BBC ONE	Factual	EastEnders	Leisure	EastEnders	Factual Entertainment
2000	BBC ONE	EastEnders	Holby	Match of the Day Live	Drama e.g. Judge John Deed	EastEnders
2030	BBC ONE	Panorama	Holby			Factual Entertainment
2100	BBC ONE	Drama e.g. Spooks, Silent Witness	Drama e.g. Mrs Pritchard		Drama e.g. State Within	Comedy Comedy
2130	BBC ONE	Archive/catch-up repeat	Archive/catch-up	Archive-catch-up	Archive/catch-up	Archive/catch-up
2200		Post-watershed Drama from BBC THREE and FOUR				
2230	BBC THREE/ FOUR					Jonathan Ross
2300	BBC THREE/ FOUR	Torchwood	Fear of Fanny	Synchronicity	Chatterley Affair	
2330	BBC TWO/ THREE/FOUR	Comedy and Music from BBC TWO, THREE, FOUR				
2400	BBC TWO/ THREE/FOUR	BBC Sessions	Lead Balloon	Electric Proms	Mitchell and Webb	Later...with Jools

- A1.30 There would be some flexibility to extend beyond the normal scheduled hours for the broadcast of live sport, music and national events. Such extensions could range from a short addition to the end of the schedule at night, to allow for the overrun of an event, to comprehensive extensions which would be applied only during the period of major tournaments such as the Olympics. The four-hour overnight schedule on DTT would never expand beyond its scheduled hours.
- A1.31 Outside of the scheduled hours, a promotional loop for the channel would be shown on satellite and cable. This would not be shown on DTT.
- A1.32 We regard the nine-hour schedule, which covers peak-time and the other main viewing periods, as essentially a full channel proposition. Given this, as well as the BBC Executive's wish to have flexibility to extend beyond the nine-hour schedule and its intention to fill capacity on cable and satellite with a promotional loop, we intend to take a broad view of its potential operating hours.
- A1.33 In the option of a limited-hours overnight service on DTT, this would show programmes in advance of the following evening's schedule (subject to rights clearances). By way of example, a new episode of *Torchwood*, to be broadcast on

BBC Two (and on the HD channel on satellite and cable) on a Sunday evening, could be shown on the overnight DTT service on the immediately preceding Sunday morning. This would allow DTT viewers with the necessary equipment to record the programme in HD in advance, and – if they chose to do so – to watch the recorded HD programme at the same time that it is available in HD to audiences on other platforms.

Technical

- A1.34 Technology for high definition television is evolving rapidly. Discussions proceed in the industry to agree transmission standards. The BBC participates in these.
- A1.35 The channel would be encoded in MPEG4 high profile level 4 for satellite and DTT and MPEG2 for cable. The BBC is working with equipment manufacturers and broadcasters (as part of the Digital Television Group) to ensure that MPEG4 profiles are adopted in such a way as to ensure that the BBC's proposed HD channel can be accessed via a wide range of set top boxes.
- A1.36 The BBC Executive expects that it might use spectrum capacity of up to 15 megabits per second (Mb/s) to provide the HD channel on DTT in the first instance. As compression technology improves, the BBC Executive says that it should be possible to carry the channel on DTT within 12 Mb/s.
- A1.37 The provision of HD programming in MPEG4 on DTT would be subject to a regulatory process by Ofcom. It would require a change to the technical code to which multiplex licences are subject.
- A1.38 While the primary aim would be to provide excellent picture quality and sound, the spectrum capacity required to provide the HD channel on DTT can be expected to reduce as compression technology improves. A reduction in the required capacity for the service would reduce the impact on other BBC services. However, under specific circumstances – such as major events or breaking news or a late sitting in the House of Commons – where it is essential to broadcast an interactive news loop or BBC Parliament overnight, the proposed HD service would be taken down or its capacity temporarily reduced.
- A1.39 The picture resolution would be in line with the internationally recognised EICTA HD-ready standard, which currently specifies either 1080i (i.e. 1,080 lines interlaced) or 720p (i.e. 720 lines progressive). On each platform, the channel would operate at the specification that is judged to offer the best balance between picture quality and the efficient use of capacity.
- A1.40 To receive the BBC HD channel, viewers would need an HD-ready television screen and an HD-capable receiver (either a set-top box or a tuner integrated into the television set). That is to say, it is not sufficient simply to have an HD-ready TV screen. For every platform, consumers will incur costs upgrading their receiving equipment from standard definition to high definition capability. These costs are likely to be incurred as a one-off purchase price or a monthly fee. This applies even to viewers who use existing HD-ready integrated DTT televisions. These would also require a set-top box, since they do not decode signals in MPEG4.
- A1.41 If the BBC were able to offer only a four-hour overnight schedule on DTT, it is likely that consumers intending to access the service would want to install an HD-capable personal video recorder (PVR) in order to record the programmes when broadcast, and view them later at convenient times. The BBC would transmit the overnight

DTT schedule as a normal linear broadcast – viewers would be able to watch the service live if they wanted, and to record whatever elements of the broadcast they choose.

Costs and reach

- A1.42 The service is forecast to cost £21.4 million per annum in 2012 – if a full nine-hour service is provided on DTT in additional capacity. This figure does not include the cost of acquiring additional spectrum.
- A1.43 The BBC Executive forecasts that about 35 per cent of households will be HD-enabled by 2012. It would expect its HD channel to reach more than 60 per cent of these, under the scenario of a full nine-hour schedule on DTT as well as cable and satellite.

Annex 2

Terms of Reference

A2.1 This document¹⁹ provides the terms of reference for Ofcom's market impact assessment of the BBC's proposal for a new High Definition Television ('HDTV') channel.

Introduction

A2.2 The BBC's new Royal Charter and Agreement, which became legally effective on 1 January 2007, requires the BBC Trust to undertake a Public Value Test ('PVT') before a decision is taken to make any significant change to the UK Public Services. The PVT comprises two elements – a Public Value Assessment ('PVA') and a Market Impact Assessment ('MIA').

A2.3 For the purposes of conducting MIAs, Ofcom and the BBC Trust have established a Joint Steering Group ('JSG'). The JSG has set these terms of reference for the HDTV MIA. The substantive findings of the MIA will, however, remain a matter for the judgment of Ofcom.

Proposition

A2.4 The BBC Executive is applying for permission to provide a single, linear, digital TV channel in high definition ('HD') format.

A2.5 It would be a mixed-genre channel, drawing from content across the BBC's channels, and would aim to meet the BBC's public purposes. The channel would be available free-to-view, and would carry no advertising.

A2.6 The BBC is seeking approval to provide a service of nine hours per day, with some flexibility to extend beyond this to allow for the coverage of significant live sport or other events. At launch, the channel would offer a schedule of three to four hours per day, building to nine hours in late 2008. 95 per cent or more of the content will be HD versions of programmes broadcast in SD on other BBC channels.

A2.7 The intention is to make the HD channel available on digital satellite, digital cable and digital terrestrial television. The BBC may also make the channel, or content from it, available on the internet, subject to value for money considerations and as technology allows. This could be through both bbc.co.uk and internet protocol TV providers.

A2.8 The BBC Executive has identified two mutually exclusive options for digital terrestrial television (DTT): the full nine-hour schedule or a four-hour schedule overnight between 0200 and 0600.

A2.9 The full nine-hour schedule would be offered on DTT if sufficient spectrum capacity were available after digital switchover.

¹⁹ This document was agreed by the Ofcom-BBC Trust Joint Steering Group in May 2007, and published by Ofcom at the start of the MIA process. It is reproduced here for ease of reference. The paragraph numbers in this Annex differ from those in the document originally published by Ofcom.

- A2.10 The four-hour overnight schedule would be offered ahead of digital switchover and possibly after switchover if insufficient spectrum capacity were available during the transmission hours of the nine-hour schedule. However, it is also possible that the BBC Executive may review its options for providing HD on DTT if sufficient spectrum were not available after switchover.
- A2.11 The four-hour overnight schedule would offer selected highlights from the following day's nine-hour schedule on cable and satellite. In order to provide capacity for this at launch, the BBC Executive proposes to take down the following services from Freeview between the hours of 0200 and 0600: BBC Four until close-down; BBC Parliament, when broadcast; two BBCi interactive video streams (accessed through the red button on remote controls); the BBCi interactive news loop (also accessed through the red button – for the avoidance of doubt, BBC News 24 would not be affected).
- A2.12 These changes would be subject not only to PVT approval by the BBC Trust but also to a separate Ofcom process. The DTT multiplex on which the BBC transmits the channels is licensed by Ofcom, so an application to Ofcom for a variation of the multiplex licence would be required.
- A2.13 Under the option where sufficient spectrum capacity becomes available following digital switchover, the four-hour overnight schedule on DTT would be replaced by the same nine-hour service as provided over the cable and satellite platforms. This would happen as digital switchover proceeds region by region. Full national coverage would be achieved on completion of digital switchover in 2012.
- A2.14 A full description of the proposed service has been agreed by the BBC Trust and Ofcom, and is published by the BBC Trust at: <http://www.bbc.co.uk/bbctrust>

Objective

- A2.15 The purpose of the MIA is to assess the impact which the introduction of the proposed service would have on products and services for which the proposed HDTV service is likely to be a direct substitute or complement, and on other related products and services. The impact of the proposed service may be either positive (in the case of the impact on a complementary product or service) or negative (in the case of a substitute product or service).

Approach

- A2.16 The MIA will be carried out in accordance with the methodology which has been agreed between the BBC Trust and Ofcom.

Output

- A2.17 The MIA will provide an assessment and, where possible and relevant, a quantifiable evaluation of the impact on the relevant primary and other services identified. This includes an assessment of the impact on producers and other participants and ultimately consumers.
- A2.18 The assessment of some effects is likely to remain purely qualitative, for example those related to investment incentives. Ofcom should, however, seek to obtain some information as to the likely impact on existing (and perhaps future) producers' plans.

A2.19 The MIA analysis may also include some sensitivity analysis to:

- identify which aspects of the service may have a particularly strong impact on the overall assessment; and
- as appropriate help identify possible modifications to the service to remove/mitigate some of these effects.

Coordination between the MIA and the PVA

A2.20 Ofcom and the BBC Trust will seek to coordinate the conduct of the PVA and the MIA by:

- sharing data and collaborating on the construction of market models where appropriate;
- attempting to minimise the risks that the PVA and the MIA are built on assumptions and inputs that are not easily reconcilable at a later stage; and
- working to ensure that the PVA and the MIA cover all relevant issues.

Identification of affected products and services

A2.21 Ofcom should consider the potential impact of the HDTV proposition on the following products and services:

- broadcast services on various delivery platforms;
- TV platform services and network services;
- provision of content – including programme-making and rights exploitation;
- hardware and software, including television reception equipment, recording and playback equipment, and physical media; and
- on-demand services.

A2.22 This list is not necessarily exhaustive. Ofcom has discretion to examine the impact on other products and services that it considers relevant in the course of conducting the MIA, subject to agreement by the JSG.

A2.23 The MIA will identify the services for which the proposed HDTV service is likely to be a direct substitute or complement (the “primary” services), as well as other related services upon which the proposed HDTV service is likely to have a significant indirect impact (the “secondary” services).

A2.24 The spectrum requirements of HDTV service provision, notably over the DTT platform, are also relevant to the market for spectrum. The opportunity cost of spectrum will therefore be taken into account.

Timetable for completion

A2.25 Ofcom is required to deliver the MIA to the BBC Trust by 17 September 2007. It is anticipated that the results of the MIA will be published alongside the BBC Trust's Public Value Assessment in Autumn 2007.

A2.26 In the event of unforeseen circumstances, or delays caused by the unavailability of data, Ofcom may ask the JSG to approve amendments to the MIA timetable. In such cases, the JSG would make clear its reasoning and revised timetable for production of the MIA report.

A2.27 Agreed by the Joint Steering Group on 17 May 2007.

Annex 3

Counterfactual Scenarios – without the BBC HD channel

Central Scenario without the BBC HD channel – assumptions

- A3.1 In the central scenario, it is assumed that HD is reasonably popular but not mass market. A significant proportion (around 30%) of households upgrade to HD (i.e. purchase a HD Ready TV and HD set top box) by 2012.
- A3.2 In this scenario, it is assumed that the different platforms have different HD offerings:
- The PSB Freesat platform launches in 2008 and it is assumed that a number of free to air HD channels become available on this platform over the course of the MIA period
 - The current HD services available on the pay satellite platform continue to be provided throughout the MIA period (though the trial BBC HD channel is withdrawn). The Freesat HD channels also become available on this platform over the MIA period
 - Alongside its HD on-demand service, the cable platform carries non-BBC HD content. The other free to air HD channels also become available on this platform over the MIA period
 - It is assumed that no HD channels are launched on the DTT platform
 - IPTV providers do not attempt to launch HD channels within the period due to capacity constraints.
- A3.3 As digital switchover rolls out across the country, we assume that most analogue customers upgrade to DTT. However, the free satellite platforms also gain a material proportion of analogue customers.
- A3.4 Platform switching occurs if the benefits outweigh the costs. As HD is reasonably popular in this counterfactual scenario, a platform with more HD services may yield greater benefits to consumers than platforms with fewer HD services. However, there are some large differences in the set up and ongoing costs of the different platforms. This suggests that differences in quality of service, such as degree of HD provision, may need to be significant before outweighing this type of switching cost.
- A3.5 Ofcom commissioned research by Illuminas into the viewing habits of households who were already HD enabled. Illuminas found that for most HD customers questioned, the programme is the main driver of TV viewing, not picture quality. The qualitative research found that:
- The HD channel is preferred and most will always check whether the programme is being shown on an HD channel before they start watching

- But, most will not choose to watch a HD programme over a programme they like.
- A3.6 Therefore in the central scenario, it is assumed that once households have become HD enabled, viewers will always switch to watch HD versions of SD content.
- A3.7 From discussions with stakeholders, it appears that many production and post production companies have started replacing their equipment and facilities to enable them to engage in HD production. This may partly be due to equipment replacement cycles. Stakeholders in the production sector told us that it is now increasingly difficult to buy new SD equipment. It may also be partly because many international programme markets (particularly the US and Japan) increasingly require HD quality productions. It is assumed that the replacement and international trends continue.

Scenario with a higher demand for high definition services – assumptions

- A3.8 In this scenario HD is immensely popular with viewers. The majority of consumers upgrade to HD, purchasing HD equipment (HD Ready TV sets and HD set top boxes) by the end of the period. The nature of adoption is on an S curve with most in the early years of the period (2007 to 2010).
- A3.9 As HD is very popular, consumers are likely to switch channels to watch HD versions of SD content. In other words, if a particular programme is on both SD and HD channels, viewers are likely to choose to switch to the HD channel to see the programme.
- A3.10 Viewers will also switch channels to watch HD programming per se. The value of a programme in HD (both its content and its quality of viewing experience) often outweighs the value to the consumer of another (different) programme in SD (both its content and quality of viewing experience). In practice, this means that viewers will switch to watch completely different programmes in HD rather than watch another programme in SD.
- A3.11 Whilst some new HD channels simulcast SD content, some HD channels are composed of completely new or different content to SD channels.
- A3.12 Given that there is a high demand for HD, this has a large influence on choice of platforms. Consumers may switch platforms to get a 'better' HD service – this ultimately depends whether the cost of switching outweighs the benefits of switching. One area where there may be switching costs is if TV service is bundled with telephony/broadband. These costs arise not only because more products and services may require switching but also because of greater difficulties in comparing packages.
- A3.13 Given the high demand for HD and viewers switching to view HD services once they have upgraded, it is likely to be commercially viable for channels that are advertising funded to launch HD channels. As a result, we assume that a number of PSBs launch HD channels alongside the launch of PSB Freesat. We assume that the HD channels available on Freesat also available on Sky and Virgin.
- A3.14 Content production moves quickly to HD. Whilst currently this is driven mainly by the need for programmes to be in HD for international sales, very quickly the impact of increased domestic demand for HD programmes feeds through to broadcasters requirements for domestic programme production. With high volumes of demand, the fixed costs of investment in HD are quickly driven down.

- A3.15 Given high demand for HD services, compression technologies are adopted more quickly than otherwise, and more HD channels can fit on the DTT platform.
- A3.16 The majority of analogue customers upgrade to DTT (Freeview) but a significant minority upgrade to Freesat, Sky, and Virgin (though upgrade to Virgin may be limited by geographic coverage) as the latter have a better HD service.
- A3.17 IPTV providers bring forward capacity expansion – HD (simulcast) channels therefore become available near the end of the period (2011-2012). These channels are subscription channels to recover the costs of the extra capacity.
- A3.18 PVRs – consumers want HD content and given the fact that there are channels offering this content, when they are HD enabled they download 'free' HD content. There is therefore limited demand for on-demand services.

Scenario with lower demand for high definition services – assumptions

- A3.19 SD is the mainstream format for consumers and they are happy with this quality of picture. Consumers may buy HD Ready sets but this is partly because nothing else is available and partly because they like flat screen TVs. The majority of consumers are satisfied with SD quality pictures and do not buy HD set top boxes to get HD services. Therefore HD is a niche service and only taken by pay TV customers i.e. those who are willing to pay a monthly subscription for this service.
- A3.20 In general, suppliers maintain their current HD offerings. After the BBC HD trial channel finishes, the pay TV platforms carry non-BBC HD content. There are no HD services on the Freesat platform, IPTV or DTT.
- A3.21 Within those households upgraded to HD, viewing is led by content rather than quality of picture. In other words, channel switching to HD channels is mainly for HD versions of SD content. There is some switching for HD programming rather than different SD programming but this is not particularly significant.
- A3.22 In the low HD scenario most analogue customers upgrade to DTT, with PSB Freesat also doing reasonably well. IPTV may get some growth over the period as consumers are not concerned about any lack of HD services on this platform. Sky and Virgin gain some analogue customers but less than PSB Freesat and DTT. HD is not a big rationale for platform choice in the low demand scenario.
- A3.23 Content production is increasingly in HD as this is required for international markets. However, programmes which have a pure domestic demand are not produced in HD. The switch over to HD production is not as fast as in the high HD scenario and unit costs remain higher for longer (as volumes are lower).
- A3.24 HD does not significantly influence platform switching. Customers will weigh up the costs and benefits of switching TV service and those who have bundled their TV with telephony/broadband may also have to switch these services. Switching costs arise not only because more products and services may require switching but also because of greater difficulties in comparing packages.