



Broadcast TV Technical Codes

Updates and amendments

Statement

Publication date: 9 November 2016

About this document

Ofcom sets technical standards for the digital terrestrial TV platform (also often known as Freeview). These standards specify the types of signal which should be used by broadcasters, and require minimum standards of reliability for the transmitters that broadcast digital TV services.

The terrestrial TV platform is continuing to change and evolve: for example, several new services have been launched since the digital TV switchover was completed in 2012. New legislation relating to the resilience of communications networks (including broadcast transmitters), has also been adopted since the broadcast TV technical codes were last revised.

We therefore carried out a consultation, which closed in June 2016, on proposals to update and rationalise the TV technical codes. This statement concludes that consultation process, and sets out the changes we are making to the technical codes in order to ensure that they remain relevant and proportionate, and that they reflect current technology and broadcast industry practice.

Contents

Section		Page
1	Executive Summary	4
2	Introduction	6
3	Revisions to the Television Technical Performance Code	10
4	Revisions to the DTT Reference Parameters	16
5	HEVC Coding	20

Section 1

Executive Summary

Background

- 1.1 This document summarises the updates and amendments that Ofcom is making to its technical codes for digital terrestrial television (DTT) services. These codes apply to DTT services which are licensed by Ofcom, but not to satellite, cable, or internet-delivered TV services.
- 1.2 In our consultation, Ofcom made a number of proposals for amending these codes. In this statement, we set out the main comments made by respondents to each of our proposals. We also set out our responses to these comments, including any changes to our original proposals that we are making in light of the comments we received during the consultation process.
- 1.3 One of Ofcom's aims is to regulate only where necessary. The technical codes are in place to ensure that licensed terrestrial TV services achieve at least minimum standards of technical quality and reliability, that they do not cause interference to other licensed services, and to ensure basic standards of interoperability with other services and with receivers. In updating the technical codes, we have taken account of technical developments and advances in general industry practices since our last reviews of the main code documents in 2006 and 2009. We have taken steps to deregulate where we consider it is appropriate to do so, while seeking to maintain important protections for DTT viewers.

The changes we are making

- 1.4 Ofcom's technical codes for DTT services are derived from Ofcom's general duties, as well as duties which relate specifically to the delivery of television multiplex services and services from the main commercial public service broadcasters. The technical codes are in place to ensure that licensed DTT services achieve at least a minimum standard of technical quality and reliability, and seek to ensure basic interoperability with other services and receivers.
- 1.5 The main DTT technical code was last revised in 2006, and its accompanying 'DTT Reference Parameters' document was last revised in 2009. Ofcom has consulted on proposals for updating and amending these documents to reflect changes in technology, industry practice and the TV market since that time. Our *Broadcast TV Technical Codes* consultation was published on 7 April 2016 and closed on 3 June 2016. Ofcom received nine responses from stakeholders to the consultation. Our responses to the stakeholder comments received during the consultation period are contained in this document.
- 1.6 This statement concludes the consultation process and sets out the revised technical code documents which certain DTT broadcasters and multiplexes must comply with as a condition of their licences. The relevant documents are:
 - a) *The Television Technical Performance Code* ("the Technical Code"); and
 - b) *Reference Parameters for Digital Terrestrial Television Transmissions in the United Kingdom* ("the DTT Reference Parameters").

- 1.7 The main changes that we are making to these documents are to:
- Rationalise and clarify the requirements on broadcasters in relation to technical quality. This includes the removal of a requirement for certain standard definition DTT services to achieve minimum subjective sound and picture ‘grades’;
 - Introduce a new requirement for DTT broadcasters to inform Ofcom of significant faults in their transmitter networks as and when they occur;
 - Remove provisions relating to analogue television transmissions, which ceased in the UK following the completion of the digital switchover programme during 2012;
 - Make other editorial amendments and updates to better reflect how terrestrial television services are now delivered.
- 1.8 We are publishing ‘markup’ versions of these two documents as Annex 1 and Annex 2 to this statement. These annexes highlight the changes that we are making to each document in comparison to the versions which were previously in force.
- 1.9 This statement also confirms that one other existing technical regulation document ceases to have regulatory effect. This is due to the fact that it relates only to the teletext services which were broadcast as part of the former analogue television system, and is therefore no longer relevant. This document is:

Rules of Operation for the use of ITU-R (CCIR) Teletext System B

Section 2

Introduction

Overview

- 2.1 This document sets out our conclusions on revising the Television Technical Performance Code ('the Technical Code') and its associated 'DTT Reference Parameters' document, which we consulted on between April and June 2016. These documents set out the high-level requirements which certain DTT services and multiplexes are required to comply with as a condition of their licences.

Background and consultation process

- 2.2 Our published Television Technical Performance Code and its accompanying DTT Reference Parameters document are derived from Ofcom's general duties, as well as specific legislative provisions relating to multiplex services and commercial public service channels that are contained in the Broadcasting Act 1990 and Broadcasting Act 1996. The documents seek to ensure that licensed services achieve at least minimum standards of technical quality and reliability, and to ensure basic technical interoperability between different DTT multiplexes and receivers.
- 2.3 The Technical Code was last revised in 2006, and the DTT Reference Parameters was last revised in 2009. In light of developments in technology, industry practices, and the structure of the television sector since that time, we published a consultation, *Broadcast TV Technical Codes*¹, on 7 April 2016 (the 'consultation document'). The consultation document set out our proposals for updating and amending the Technical Code and the DTT Reference Parameters to reflect changes in both the technology and operational structure of the terrestrial television sector. The proposed changes also sought to ensure that we were only regulating where necessary, while retaining viewer protections where appropriate.
- 2.4 The consultation closed on 3 June 2016. We received nine responses of which three were confidential, two were partially confidential, and four were non-confidential. The non-confidential responses included a submission from Digital UK on behalf of its members (the BBC, ITV, Channel 4 and Arqiva) who hold Broadcasting Act and/or Wireless Telegraphy Act DTT licences. ITV also submitted its own separate response which included comments that were not covered in its joint Digital UK submission.
- 2.5 We have published the partially-confidential and non-confidential responses on our website¹.
- 2.6 This statement sets out our conclusions to that consultation in light of the stakeholder responses that we received.

Legislative background

- 2.7 Ofcom's duties and powers in relation to licensing television multiplex services and DTT services are set out under Part 1 of the Broadcasting Act 1996 ("the 1996 Act"), as amended by the Communications Act 2003 ("the 2003 Act").

¹ <https://www.ofcom.org.uk/consultations-and-statements/category-2/broadcast-tv-technical-codes>

- 2.8 In particular, Ofcom is required to include such conditions in television multiplex licences as appear to be appropriate, having regard to any duties which are, or may be, imposed on Ofcom or the licensee under the Broadcasting Act 1990 (“the 1990 Act”) and the 1996 Act, or the 2003 Act².
- 2.9 In relation to the technical quality of services provided by multiplex licensees, Section 12 of the 1996 Act requires Ofcom to include conditions in multiplex service licences that are appropriate for securing that the signals carrying the service attain high standards of technical quality and reliability³. National multiplex licences issued under the 1996 Act therefore require licensees to observe Ofcom’s Television Technical Performance Code.
- 2.10 Similarly, Section 66 of the 1990 Act requires Ofcom to include such conditions as are appropriate in the licences for Channel 3 (ITV, UTV and STV), Channel 4 and Channel 5 for requiring the signals carrying these services to attain high standards of technical quality and reliability⁴. The Channel 3, Channel 4, and Channel 5 licences therefore also require these licensees to observe Ofcom’s Television Technical Performance Code.
- 2.11 Other TV multiplex services (specifically the ‘600 MHz’, the ‘Geographically Interleaved’ and the ‘Northern Ireland’ multiplexes) operate under licences issued under the Wireless Telegraphy Act 2006 (“the 2006 Act”) only. Under the 2006 Act, a wireless telegraphy licence may be granted subject to such terms, provisions and limitations as Ofcom thinks fit.⁵ These powers have been used, for example, to ensure that DTT services operating solely under the Wireless Telegraphy Act are technically compatible with those licensed under the Broadcasting Act 1996. For example, the 600 MHz multiplex licences require licensees to comply with Ofcom’s Technical Performance Code, and the Geographically Interleaved multiplex licences require the licensees not to use certain technical parameter values which would conflict with existing DTT multiplexes.
- 2.12 In addition to our specific duties and powers under the Broadcasting Acts and the Wireless Telegraphy Act (which fall upon the licensed broadcasters in the form of licence conditions), additional legislative requirements on communications providers have come into force in recent years. In the case of television broadcasting, these requirements fall upon the transmission service provider rather than the broadcaster. Specific requirements relating to the resilience of communications networks are contained in revisions to the 2003 Act⁶, which Ofcom most recently provided Guidance⁷ on during 2014.

Overview of licensed DTT multiplexes

- 2.13 Multiplexes licensed under the Broadcasting Act 1996 must also hold Wireless Telegraphy Act (WT Act) licences in relation to their use of the radio spectrum. Some multiplexes are authorised to operate under a Wireless Telegraphy Act licence only, but no DTT multiplex can operate under a Broadcasting Act licence alone.

² Section 4(1)(a) of the 1996 Act

³ Section 12(1)(g) of the 1996 Act

⁴ Section 66(4) of the 1990 Act

⁵ Section 9 of the 2006 Act

⁶ Sections 105(a) to 105(d) of the Communications Act 2003

⁷ https://www.ofcom.org.uk/data/assets/pdf_file/0021/51474/ofcom-guidance.pdf

- 2.14 The main purpose of a Wireless Telegraphy Act licence is to authorise the use of radio frequency spectrum for a particular application or applications. Ofcom also has discretion to include certain other conditions in Wireless Telegraphy Act licences: for example, particular technologies may be mandated, or compliance with existing Codes and technical standards can be required.
- 2.15 DTT services began broadcasting in 1998. The platform originally comprised six multiplexes, and these six multiplexes are still in operation (although they are not all still operated by the original licence holder). Five of the original six multiplexes operate under Broadcasting Act licences issued by Ofcom, and the remaining multiplex is 'gifted' to the BBC under its Royal Charter and Agreement.
- 2.16 These six multiplexes are sometimes known as the digital switchover, or DSO, multiplexes, as they are the multiplexes which were operational, and whose coverage was enhanced, during the digital TV switchover process.
- 2.17 In addition to the six DSO multiplexes, four further DTT multiplexes have been launched since the completion of digital switchover. These are COM7 and COM8 (which occupy the 600 MHz spectrum band, and which operate under Wireless Telegraphy Act Licences only); a local TV multiplex (which operates under a Broadcasting Act Licence); and the 'Northern Ireland multiplex' (which provides RTÉ and TG4 services to Northern Ireland, and which operates under a Wireless Telegraphy Act Licence only).
- 2.18 Spectrum licences for two further location-specific services – the 'geographically interleaved' multiplexes – were awarded in 2009 for the Manchester and Cardiff areas. Only the Manchester service is currently providing a DTT service. The geographically interleaved multiplexes are licensed under the Wireless Telegraphy Act only.

2.19 The table below summarises the current licensed and operational multiplexes:

Licence Name	Multiplex Name	Designation	Operator	Licence type	Notes
Multiplex 1	BBC A	PSB1	BBC	Gifted & WT Act	DSO
Multiplex 2	D3&4	PSB2	Digital 3&4	B Act & WT Act	DSO
Multiplex A	SDN	COM4	SDN	B Act & WT Act	DSO
Multiplex B	BBC B	PSB3	BBC	B Act & WT Act	DSO
Multiplex C	Arqiva A	COM5	Arqiva	B Act & WT Act	DSO
Multiplex D	Arqiva B	COM6	Arqiva	B Act & WT Act	DSO
Multiplex E	Interim 600 MHz multiplexes	COM7, COM8	Arqiva	WT Act	
Multiplex L	Local	Local	Comux	B Act & WT Act	
GI Multiplex	Manchester GI	G-MAN	Entertainment Media Group	WT Act	
NI Multiplex	Northern Ireland Multiplex	RNI-1	Multiplex Services (NI) Ltd.	WT Act	

Table 1: Overview of current DTT multiplexes

Applicability of the Technical Codes to different multiplexes

- 2.20 The DSO multiplexes, which operate under Broadcasting Act and WT Act licences, are required to observe both the Technical Code and the Reference Parameters.
- 2.21 The 600 MHz WT Act licences also require licensees to observe both the Technical Code and the Reference Parameters.
- 2.22 The Local Multiplex Broadcasting Act licence requires the licensee to observe only the Reference Parameters. This requirement seeks to ensure technical interoperability of the local multiplex with existing DTT multiplexes, but means that the licensee is not subject to the more general technical quality and performance requirements which are contained in the Technical Performance Code.
- 2.23 The WT Act licences for the Geographic Interleaved and Northern Ireland multiplexes require the licensees to ensure that certain technical aspects of their services (specifically the labelling of transport stream components including logical channel numbers, service identification and network identification) do not conflict with other DTT services. This requirement is intended to ensure a basic level of interoperability with existing DTT services. However, there is no explicit requirement for these multiplexes to observe the Reference Parameters or Technical Code.

Structure of this document and new Codes

- 2.24 Sections 3, 4, and 5 summarise the points raised by stakeholders in response to the three specific questions in our consultation, along with Ofcom's responses to these comments. We also discuss any modifications to our original proposed changes in light of those comments and any other relevant considerations.
- 2.25 Alongside this statement, we are also publishing updated versions of the Technical Code and the DTT Reference Parameters document, which are effective from today's date.

Section 3

Revisions to the Television Technical Performance Code

Overview

- 3.1 In our consultation document we identified several areas within the Television Technical Performance Code ('the Technical Code') for proposed revisions. The main changes that we proposed were to:
- Modernise technical standards requirements, including the removal of specific subjective picture and sound 'grade' requirements for certain standard definition channels;
 - Re-focus and rationalise our requirements in relation to the monitoring and reporting of TV transmitter faults;
 - To make other technical and editorial revisions to bring the Technical Code up to date.
- 3.2 The remainder of this section outlines the changes that we proposed to make to each part of the Technical Code, followed by the stakeholder responses we received, and our responses to these comments along with any changes that we have decided to make to our initial proposals in light of the consultation responses.

Changes to Section 1 of the Technical Code ('Introduction')

- 3.3 Our consultation did not propose any changes to Section 1 of the Technical Code, which briefly sets out the legislative basis of the Technical Code. However, on further consideration, we have decided to make some editorial changes to this section, primarily to clarify the applicability of the Technical Code.
- 3.4 The current text of the Introduction only refers to services licensed under the Broadcasting Acts of 1990 and 1996. We believe that it would be beneficial for the Introduction to make specific reference to multiplex services which are licensed solely under the Wireless Telegraphy Act 2006, some of which are required by their licences to observe the Technical Code.
- 3.5 These changes are purely editorial, do not alter the scope or applicability of the Technical Code, and are simply intended to provide additional clarity. We will therefore include these additional changes in the revised Technical Code.

Proposed Changes to Section 2 of the Technical Code ('The Television Signal')

Ofcom Proposals

3.6 In summary, our consultation proposed to make the following changes to Section 2 of the Technical Code:

- Remove references to the former analogue TV system and its associated technical requirements. Analogue television services are no longer being broadcast in the UK, and therefore their inclusion in the Technical Code is no longer relevant
- For similar reasons, we proposed to remove reference to the Rules of Operation for Teletext⁸ (teletext services were formerly transmitted as part of analogue TV signals, but are no longer being broadcast).

Consultation Responses

3.7 Four respondents agreed with these specific proposals, and four respondents did not express an opinion. One confidential respondent stated that they disagreed with the proposed changes to the Technical Code as a whole, but did not provide any further details of their reasons for this.

Ofcom consideration of responses

3.8 Ofcom notes the support for these changes amongst the respondents who expressed an opinion. The proposal relates to removing references to analogue television systems and its associated teletext services. These services are no longer being broadcast in the UK following the completion of the digital switchover process, and we will therefore update the Technical Code as originally proposed.

Proposed Changes to Section 3 of the Technical Code ('Technical Quality Standards')

Ofcom Proposals

3.9 In summary, our consultation proposed to make the following changes to Section 3 of the Technical Code:

- Modify the text of the Technical Code to clarify which licensees our requirements on technical quality procedures apply to;
- Remove a requirement for the standard-definition (SD) versions of Channels 3, 4, and 5 on DTT to meet minimum subjective picture and sound 'grade' levels, noting that other DTT services (including HD simulcasts) are not subject to corresponding specific subjective picture grade requirements;
- Remove a specific provision requiring broadcasters to maintain good sound and vision synchronisation ('lip-sync'), noting that other similar detailed characteristics of the television signal are not subject to specific regulation;

⁸ Ofcom Rules of Operation for the use of ITU-R Teletext System B

- Remove a requirement for the performance of re-broadcast links (RBLs), which are used to provide signals to relay transmitters. The current requirements on RBL quality in the Technical Code are specified in terms of permissible analogue picture quality degradation, which is no longer relevant in the context of a digital transmission environment.

Consultation Responses

- 3.10 Three respondents agreed in whole or in part with our proposals on Section 3 of the Technical Code. One partially-confidential respondent commented that they found the quality of high-definition TV pictures to be poor. A confidential respondent stated that they disagreed with the proposed changes to the Technical Code as a whole, but did not provide any further details of their reasons for this.
- 3.11 Two of the specific proposed changes to the Section 3 of the Technical Code elicited more detailed comment from some respondents.
- 3.12 The first of these was our proposal to remove the requirement for certain channels to achieve minimum subjective picture and sound 'grade' standards.
- 3.13 Here, techUK suggested making the removal of this requirement contingent on the broadcasters providing high definition (HD) simulcast services, including full regionality.
- 3.14 MG Alba stated that they agreed that subjective sound and picture grade requirements were based on analogue technology and standard-definition broadcasts, but wished to see the current requirement replaced with standards that are relevant to digital and high-definition production.
- 3.15 One partially-confidential respondent stated that Ofcom should mandate technical quality standards, particularly in the case of the public service broadcasters, because commercial broadcasters are motivated by profit to maximise the number of services broadcast.
- 3.16 One confidential respondent disagreed with the proposal to remove the picture and sound grade requirement because they believed that picture quality was currently poor on standard-definition services, and that it would get worse in the absence of regulation.
- 3.17 The second specific proposed change which respondents made comments on was the removal of the sound/vision synchronisation ('lip-sync') requirement.
- 3.18 Digital UK, MG Alba, and one confidential respondent stated that the Technical Code should continue to contain a reference to sound/vision synchronisation. These responses cited factors including the fact that correct lip-sync is a crucial aspect of the production and transmission chain, and that with the large number of services now available, correct lip-sync is an important factor in ensuring viewer confidence in the DTT platform. One partially-confidential respondent also commented that they had observed poor lip-sync in their own viewing, but did not explicitly object to our proposal.

Ofcom consideration of responses

- 3.19 Ofcom notes the comments raised by respondents on our picture and sound grade proposals. Industry stakeholders were generally supportive of the change, while responses from individuals did not support the removal of the requirement.
- 3.20 Ofcom continues to believe that the removal of specific subjective picture and sound grade requirements on the standard-definition versions of the commercial public service broadcasters channels on DTT is an appropriate de-regulatory measure. As we noted in our consultation, PSB services on DTT will still be subject to a requirement to demonstrate that they have procedures in place for maintaining high standards of technical quality, and Ofcom will investigate complaints or emerging issues relating to technical quality matters as necessary.
- 3.21 We also believe that the individual broadcasters and multiplex operators are best-placed to determine the picture quality they achieve, in line with viewer expectations. We are also mindful of the fact that the high-definition simulcasts of these services on DTT have never been subject to specific regulatory requirements relating to subjective quality, and neither have any services (whether standard definition or high definition) which are delivered by alternative platforms such as satellite or cable.
- 3.22 We do not currently believe that it would be proportionate or administratively efficient to make the removal of standard definition grade requirements contingent on the availability of high-definition simulcasts of specific services, or on specific levels of regionality of those HD simulcasts. Instead we believe that further enhancements to the availability of HD channels (and the level of regionality provided) will be best delivered by the DTT market directly. We expect the DTT platform to continue to evolve over time, and this may well include the availability of more HD simulcasts and regionality (for example, Channel 5 launched an HD simulcast of its SD service on DTT during May 2016 while this consultation was underway).
- 3.23 We note MG Alba's desire to see the subjective grades requirement replaced by new standards which are relevant to digital and HD production. We believe that other industry bodies, for example the Digital Production Partnership⁹ are better-placed to drive wider industry adoption of common technical production and distribution standards.
- 3.24 We therefore confirm that we will proceed with the removal of subjective picture and sound grade requirements for the commercial public service channels as proposed in our consultation.
- 3.25 On lip-sync, we note the wide consensus amongst industry respondents in favour of retaining a requirement for a requirement in this area. We do not anticipate that retaining the requirement would constitute a disproportionate burden on broadcasters, and agree that it would help provide a basic level of oversight for one of the fundamental characteristics of television transmission. We have therefore decided to retain the existing requirement.
- 3.26 No respondents commented on our proposal to remove the existing requirement specifying minimum performance standards for re-broadcast links (RBLs). We will therefore amend this part of the Technical Code as proposed to remove the current provision in section 3.6 of the Technical Code.

⁹ www.digitalproductionpartnership.co.uk

3.27 We have also decided to make further minor editorial changes to the start of Section 3 in order to provide more clarity on the specific television multiplexes and services that this section applies to.

Proposed Changes to Section 4 of the Technical Code ('Reliability')

Ofcom Proposals

3.28 In summary, our consultation proposed to make the following changes to Section 4 of the Technical Code:

- Retain the existing minimum reliability standards for TV transmitters, but clarify that these requirements fall on the relevant DTT multiplex operators rather than individual channels. The transmitter availability requirement provides an important regulatory tool for ensuring that viewers receive a good quality of experience, particularly for smaller relay transmitters where commercial incentives alone may not be sufficient to deliver a reliable experience;
- Add a common list of 'Reference Transmitters' (i.e. those larger transmitters which are required to achieve enhanced levels of availability) as an Annex to the Technical Code. Previously, separate Reference Transmitter lists had been maintained which varied according to the individual broadcaster or multiplex operator, and publishing them as part of the Technical Code provides a common, open approach;
- Re-introduce a requirement for 'live' transmitter fault reporting, whereby broadcasters would be required to notify Ofcom of significant faults in their transmitter networks as (or soon after) they occur. Prior to its last revision in 2006, the Technical Code included a similar requirement for fault reporting. In light of subsequent legislative developments and focus on network security and resilience, we believe that it is appropriate to re-introduce a live fault reporting system;
- Maintain a requirement for multiplex operators and commercial public service broadcasters to submit annual technical reports to Ofcom, but to clarify the scope of these reports and update the topics which should be included. Specifically, we proposed clarifying that only the multiplex operators' reports need include the results of their networks' performance against the transmitter availability requirements;
- Remove a general requirement on the reliability of access services (subtitling, signing and audio description). Ofcom separately publishes specific, more detailed guidance and requirements for television access services;
- Remove requirements relating to analogue TV broadcasting (which are now out-of-date following the completion of digital switchover), including the removal of dedicated transmitter availability requirements for the Channel 3 Breakfast licensee.

Consultation Responses

3.29 Digital UK and MG Alba agreed with our proposal on availability standards. No other respondents commented on or objected to this specific proposal. Digital UK also suggested adding the Pendle Forest transmitter to the list of Reference Transmitters.

3.30 Digital UK, MG Alba and one confidential respondent agreed with our proposals on transmitter fault reporting. No other respondents commented on or objected to this

specific proposal. Digital UK also offered further suggestions for developing common fault reporting mechanisms and thresholds on behalf of its broadcaster members.

- 3.31 Digital UK and MG Alba agreed with our proposals on annual technical reports. In its separate submission, ITV stated that it agreed in principle with our proposal, but that further consultation between the broadcasters and Ofcom would be required on the remit of the reports. No other respondents commented on or objected to this specific proposal.
- 3.32 Digital UK, MG Alba and one confidential respondent agreed with our proposal to remove the reference to access services from the Technical Code. No other respondents commented on or objected to this specific proposal.
- 3.33 ITV and MG Alba agreed with our proposal to remove the separate Channel 3 breakfast licence availability requirement. No other respondents commented on or objected to this specific proposal.

Ofcom consideration of responses

- 3.34 We note that those respondents who expressed an opinion on our proposals for Section 4 of the Technical Code agreed with the proposed changes, and we are grateful for the additional suggestions provided by some respondents.
- 3.35 We will amend Section 4 as proposed in our consultation, and will add Pendle Forest to the list of Reference Transmitters (this site had been omitted in error from our draft list of Reference Transmitters).
- 3.36 Since the consultation closed, we have held informal discussions with broadcasters, their transmission operator and Digital UK about implementing a practical framework for live fault reporting in the least burdensome way possible, as well as developing a common format for annual technical reports. We are grateful for the constructive approach taken by the broadcasters, and we will be trialling a practical live fault reporting system over the next few months.
- 3.37 We will therefore amend Section 4 of the Technical Code as originally proposed.

Proposed Changes to Section 5 of the Technical Code ('Coverage')

- 3.38 This section of the Technical Code is essentially informative, in that it defines the coverage of the DTT transmitter networks in terms of licence requirements on the DTT broadcasters, and national frequency plans. Our consultation proposed to make minor editorial amendments to this section in order to reflect the current situation, and to remove references to analogue television services.
- 3.39 Digital UK, MG Alba, and one confidential respondent agreed with our proposal. No other respondents commented on or objected to the proposal.
- 3.40 We will therefore amend Section 5 of the Technical Code as originally proposed. We are also taking the opportunity to make further minor editorial changes to Section 5 in order to provide more clarity on the specific television multiplexes and services that this section applies to.

Section 4

Revisions to the DTT Reference Parameters

Overview

- 4.1 The technical specifications set out in the *Reference Parameters for Digital Terrestrial Television Transmissions in the United Kingdom* (the 'DTT Reference Parameters') have two main purposes. These are to ensure basic technical interoperability between the DTT broadcasting and receiver sectors, and to ensure that licensed DTT services operate using technical transmission parameters which allow services to achieve (where appropriate) levels of coverage that are consistent with Ofcom policy and with wider public policy goals (for example, the near-universal coverage of public service broadcaster multiplexes).
- 4.2 While the interoperability requirements in the DTT Reference Parameters provide a 'baseline' set of UK transmission modes, they do not (and are not intended to) cover all aspects of interoperability. The Digital Television Group (DTG) publishes a more comprehensive set of technical standards and interoperability requirements for the UK DTT platform in their 'D-Book'¹⁰.
- 4.3 The Reference Parameters are directly referred to in the Television Technical Performance Code, and any licensee who is required to comply with the Technical Code must also observe the Reference Parameters.
- 4.4 Certain other DTT services are also required to observe the Reference Parameters. For example, the local TV multiplex is required to comply with the Reference Parameters, but is not required to observe the Technical Performance Code.
- 4.5 In our consultation, we proposed to make changes to the DTT Reference Parameters in order to rationalise and update its requirements. We also asked stakeholders for views on whether a transmission profile which included the advanced HEVC video encoding standard should be included in the Reference Parameters.
- 4.6 The remainder of this section outlines the changes that we proposed to make to each part of the DTT Reference Parameters, followed by the stakeholder responses we received, and (where relevant) our responses to these comments and any changes that we have decided to make to our initial proposals

Proposed updates to the DTT Transmission Modes

- 4.7 Our consultation proposed updating the tables of DVB-T transmission modes to reflect those that are currently in use in the UK, and to include (on an informative basis) the transmission mode used by the Northern Ireland Multiplex (which is not required to observe the DTT Reference Parameters). We also proposed to make editorial amendments to clarify the applicability of transmission modes to specific multiplexes.

¹⁰ <http://www.dtg.org.uk/work/dbook.html>

- 4.8 Digital UK and one confidential respondent agreed with this proposal. One confidential respondent disagreed with our proposed changes to the DTT Reference Parameters as a whole, but did not provide any further details of the reason for their views. No other comments were received on the DTT transmission modes proposal.
- 4.9 We will therefore update the Transmission Modes tables to reflect the DTT transmission modes currently in use, as proposed in the consultation. We have also made a minor editorial change to the narrative text above the tables in order to further clarify which multiplexes the transmission mode tables apply to.

Proposed rationalisation of standard definition picture resolution and audio bitrate requirements on Qualifying Services

Ofcom proposals

- 4.10 The 2009 version of the DTT Reference Parameters requires the standard definition versions of the commercial public service broadcasters' channels (Channels 3, 4, and 5) on DTT to be encoded with a picture resolution of either 720 x 576 pixels or 704 x 576 pixels. These are the maximum resolutions supported by European standard definition (SD) digital TV systems.
- 4.11 Other SD services on DTT, and on satellite and cable, may opt to use horizontally 'sub-sampled' resolutions in order to reduce the instantaneous bandwidth required for a service.
- 4.12 As with our proposal to remove the subjective picture and sound grade requirements from these services in the Technical Code, our consultation also proposed to remove the minimum picture resolution requirement for the standard definition commercial public service channels from the DTT Reference Parameters. This change would provide consistency with the situation for the high definition simulcasts of these services on DTT (as well as all variants of these services on other platforms) where no similar resolution requirement applies.
- 4.13 We also proposed to remove the recommended minimum audio bitrates listed in the 'Source Coding of Audio Signals' section of the DTT Reference Parameters. These values have always been advisory rather than mandatory, and the DTT Reference Parameters has never specified similar minimum recommended audio bitrates for high-definition services or other services which use alternative audio encoding standards. We also noted that many broadcasters already achieve satisfactory audio quality at bitrates below those listed in this section.

Consultation Responses

- 4.14 Digital UK agreed with the proposal to remove the minimum picture resolution requirement and the suggested audio bitrates from the DTT Reference Parameters. In its own separate response, ITV agreed with the proposal to remove the minimum picture resolution requirements.
- 4.15 MG Alba disagreed with both proposals, arguing that the removal of the requirements would '*allow the broadcasting of sound and pictures well below the quality achievable on [digital satellite]. A reduction of picture quality on Freeview[would] have a negative impact on viewers*'.
- 4.16 One partially confidential respondent disagreed with the proposed removal of the minimum picture resolution requirements, and stated that the proposal was '*part of*

an apparent race to the bottom in our TV standards. A good codec should be able to handle the lower bitrate without blockiness merely by removing the high frequency parameters from the signal. That the codecs are unable to do this is an indication that the bitrate is already too low.'

- 4.17 As mentioned above, one confidential respondent disagreed with our proposed changes to the DTT Reference Parameters as a whole, but did not provide any further details of the reason for their views.

Ofcom consideration of responses

- 4.18 We note the views of respondents who commented on these proposals.
- 4.19 We do not believe that the removal of the SD resolution requirement will necessarily lead to the affected broadcasters delivering services with degraded technical quality. Nor do we believe that removing the resolution requirement from the three specific services to which they currently apply will lead to a wider reduction in picture quality on the DTT platform. We set out the reasons for this below.
- 4.20 We note that only the SD versions of Channel 3, Channel 4, and Channel 5 are subject to specific minimum resolution requirements, and no other services on the DTT platform (including the HD simulcasts of these three services) have corresponding requirements. We also note that the vast majority of SD services on the 'public service broadcaster' multiplexes (including the BBC's core SD channels, as well as 'portfolio channels' from ITV and Channel 4) are currently carried in full SD resolution, even though these services are not subject to regulatory minimum resolution requirements.
- 4.21 We recognise that transmitted picture quality can be affected by a wide range of factors throughout the production and transmission chain, and can be influenced by many technical and operational decisions made by both broadcasters and multiplex operators. The majority of these decisions are not subject to specific regulation, and we believe that the broadcasters themselves are best-placed to determine how to configure the detailed technical characteristics of their services. While the removal of the resolution requirement will offer the three affected channels additional flexibility, and will align the technical requirements on these services with other DTT channels, we expect that the commercial public service broadcasters will continue to be mindful of audience expectations of the quality of their services. PSB services on DTT will still be subject to a requirement in the Technical Code to demonstrate that they have procedures in place for maintaining high standards of technical quality, and Ofcom will investigate complaints or emerging issues relating to technical quality matters as necessary.
- 4.22 We therefore continue to believe that the removal of minimum picture resolution requirement for standard definition qualifying services on DTT is an appropriate de-regulatory measure. The change will align the requirements on these services with the requirements on commercial PSBs' high-definition DTT simulcast services, and provide consistency with other platforms (such as digital satellite and cable) where there are no comparable regulatory requirements on minimum picture resolutions.
- 4.23 The measure is also consistent with our decision to remove the requirement for these services to meet specific minimum picture and sound 'grade' levels, as set out in Section 3 of this consultation.

- 4.24 We will therefore remove the SD resolution requirements from the DTT Reference Parameters as proposed in our consultation.
- 4.25 We will also remove the table of suggested audio bitrates from the DTT Reference Parameters, recognising that the table has only ever been advisory, and that many broadcasters already achieve satisfactory audio quality at bitrates below those suggested in the table (due to factors such as generational efficiency gains in coding equipment).

Section 5

HEVC Coding

Overview

- 5.1 Our consultation on changes to the Technical Codes included a specific question which sought stakeholders' views on whether the DTT Reference Parameters should be amended to include a 'profile' allowing HEVC (High Efficiency Video Coding, or H.265) to be used as an alternative to the existing MPEG-2 (H.262) and AVC (Advanced Video Coding, or H.264) video encoding standards on DTT in the UK.
- 5.2 HEVC is a technically advanced video encoding standard which offers significant gains in efficiency (i.e. the bitrate required to deliver a given service) compared to older encoding standards. This makes HEVC particularly well-suited for delivering bandwidth-intensive video formats, such as the emerging Ultra High Definition (UHD) services, or to reduce the bandwidth required for HD services.
- 5.3 In our consultation, we proposed not to include an HEVC profile in the DTT Reference Parameters at the current time. This position was informed by the fact that HEVC had only recently been incorporated in the relevant DVB technical standards, and that further enhancements to the use of HEVC in DVB systems (such as high dynamic range and higher framerate video) were still being standardised.
- 5.4 However, we stated that we would keep technical and market developments under review, and would consider revising the Reference Parameters to include HEVC in future if required.

Consultation Responses

- 5.5 Digital UK, MG Alba, and one confidential respondent agreed with our proposal on HEVC.
- 5.6 techUK cited a potential future requirement for UHD services on DTT, and stated that device manufacturers favour the use of common global standards for free-to-air TV platforms. techUK also mentioned existing demand for HEVC services, and that these have already been deployed in other European markets and elsewhere. techUK recommended that Ofcom consider extending the DTT Reference Parameters to include HEVC encoding in order to facilitate planning for such services at an early stage, and therefore to allow DTT to retain its value against alternative platforms such as IP and satellite.
- 5.7 One confidential respondent and one partially-confidential respondent disagreed with our proposal not to include an HEVC profile in the DTT Reference Parameters. The confidential respondent did not provide any details about their objection. The partially-confidential respondent stated that the Reference Parameters should include a "*good profile, or we will end up with broadcast 'Ultra' HD that is no better than 1080p HD was when digital broadcasting began*".

Ofcom consideration of responses

- 5.8 We agree with techUK that widely-deployed common technical standards help to ensure the continued viability of free-to-air broadcasting platforms, and also help ensure that cost-effective reception equipment is available to viewers. However,

there has been no demand to date from UK DTT broadcasters to launch HEVC services. We are also conscious that standardisation work for further enhancements to the use of HEVC is still ongoing within international groups such as the DVB. We therefore continue to believe that it would be more appropriate to introduce an HEVC profile into the DTT Reference Parameters when the potential market demand, and technical standardisation status, are more clearly known.

- 5.9 In addition, multiplex operators will remain free to propose use of HEVC for specific services on either a trial or longer-term basis. When considering any such request, Ofcom would take into account the potential benefits and impact on viewers and the DTT platform more widely (taking into account factors such as the installed base of receivers which are capable of decoding HEVC).
- 5.10 We have therefore decided not to include an HEVC profile in the Reference Parameters at this time. We will however add a note to the 'Source Coding of Video Signals' section of the DTT Reference Parameters explicitly stating that alternative video encoding standards may be employed with Ofcom's prior consent, in order to reduce the potential regulatory barriers to future trials or implementation of advanced video coding standards.