



600 MHz and geographic interleaved spectrum

Summary of responses to consultation on potential
uses and next steps

Interim Statement

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Contents

Section		Page
1	Introduction	1
2	Summary of responses	3
3	Next steps	11

Annex		Page
1	Respondents to consultation	13

Section 1

Introduction

- 1.1 The 600 MHz band and geographic interleaved spectrum are part of the UK's digital dividend that will be freed up for new uses with the switchover from analogue to digital terrestrial television (DTT) that is due to be completed in 2012. The spectrum could be used to provide a range of new and improved services to consumers, for example a number of additional high definition channels on Freeview.
- 1.2 We are considering how to make the spectrum available in ways that best suit the needs of potential users, so that they maximise the total value to society they generate over time. To help us do this we published a consultation¹ in February 2010 asking stakeholders about the potential uses of this spectrum. This document provides a summary of responses² to that consultation and sets out our next steps in making this spectrum available for new uses.
- 1.3 This section provides a brief recap of:
- the spectrum under consideration; and
 - our previous consultations on this spectrum, in particular our February 2010 consultation.

The spectrum

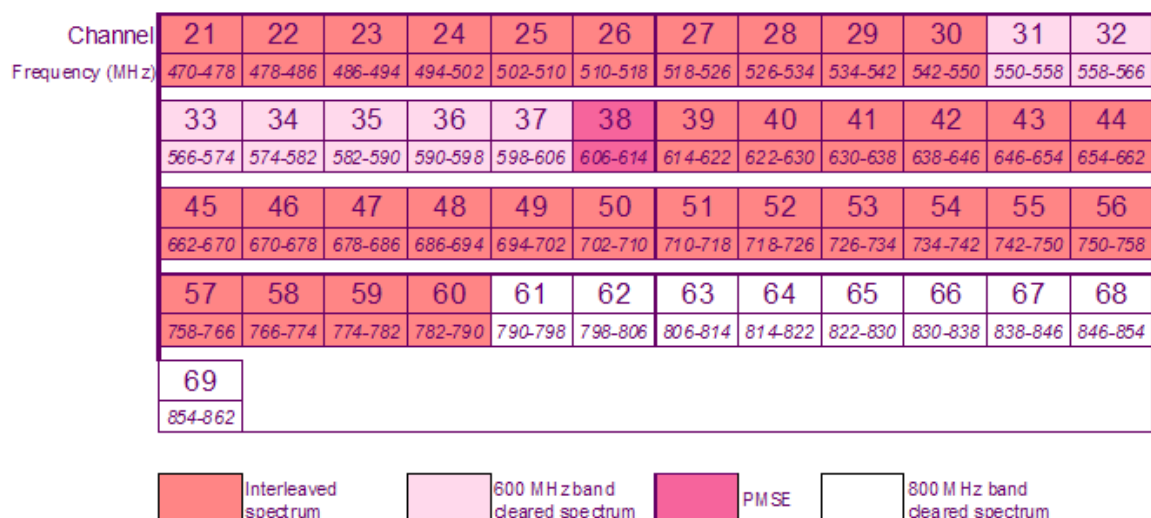
- 1.4 The digital dividend is the spectrum that is freed up for new uses by digital switchover. There are two distinct categories of spectrum in the digital dividend:
- cleared spectrum – the spectrum that by the end of 2012 will be fully cleared of existing uses, primarily analogue terrestrial television; and
 - interleaved spectrum – capacity available within the spectrum that will be used after digital switchover to carry the six existing Digital Terrestrial Television (DTT) multiplexes³.
- 1.5 Figure 1 below shows the frequencies which comprise the 600 MHz and interleaved spectrum. The 600 MHz band is the lower band of the cleared digital dividend spectrum, from 550 MHz to 606 MHz, also referred to as channels 31 to 37. We are separately considering how to award the upper band of digital dividend spectrum (commonly referred to as the 800 MHz band). The 600 MHz will be available for new uses from the end of digital switchover in late 2012. Interleaved spectrum will be available in the frequency ranges 470- 550 MHz (also known as channels 21-30) and 614-790 MHz (also known as channels 39-60). The new configuration of interleaved spectrum will become available for use as regional switchover progresses.

¹ Digital dividend: 600 MHz band and geographic interleaved spectrum Consultation on potential uses http://stakeholders.ofcom.org.uk/consultations/600mhz_geographic/

² Full copies of all non-confidential responses are available on Ofcom's website http://stakeholders.ofcom.org.uk/consultations/600mhz_geographic/?showResponses=true

³ These multiplexes currently make up the UK's DTT platform, commonly referred to as Freeview.

Figure 1. The digital dividend



1.6 In our most recent consultation we suggested that the 600 MHz and geographic packages of interleaved spectrum (geographic interleaved spectrum) had a wide range of potential uses including: DTT, mobile broadband, mobile TV, programme making and special events (PMSE) and broadband wireless access.

Previous consultations

1.7 In summer 2008, we consulted on the detailed design of the digital dividend awards. At that time, we proposed to award the upper and lower bands of cleared spectrum together and to hold a series of awards of geographic interleaved spectrum. Several important developments subsequent to then caused us to reconsider those proposals. The main one was our decision to align our upper cleared band with the 800 MHz band identified for release by an increasing number of other European countries. Therefore in February 2010 we published a further consultation that:

- updated stakeholders on spectrum availability in the rest of the digital dividend and how technical considerations may affect spectrum use; and
- sought stakeholders' input on potential uses of the spectrum and on their level of interest in acquiring it to help us develop proposals on how best to make the spectrum available.

Section 2

Summary of responses

Introduction

- 2.1 This section provides a summary of non-confidential responses to our February 2010 consultation. Comments from confidential responses are only referred to where this helps to illustrate the range of comments received and does not reveal the identity of the respondent concerned or any other confidential information.
- 2.2 Stakeholder responses to each of the specific consultation questions are considered in order. In addition, a summary of other comments not covered by the specific questions is included.

Answers to specific questions

Question 1: Do you have any comments on the application of the protection clause to all new licences for the 600 MHz band and geographic interleaved spectrum?

- 2.3 There was broad support from stakeholders for the application of a protection clause to all new licences in order to protect DTT coverage. Other specific comments in response to this question were:
- **Confederation of Aerial Industries and Mr B Copsey:** Protection clause must ensure that the cost of compensation or replacement of domestic and professional equipment is covered by the licence holder.
 - **Samsung:** Request that Ofcom works closely with the European Commission (and other appropriate bodies) to expedite work towards a digital dividend spectrum harmonisation across Europe before implementing a nationally specific initiative.
 - **Scottish Screen:** Suggest waiting for a Scotland wide survey of potential uses and technical considerations.
 - **Everything Everywhere:** Unclear whether the protection clause wording for 600 MHz band will be the same as that for the 800 MHz band. Impact of protection clause must known before both 600 and 800 MHz awards. Concerns relating to the protection clause have already been raised in the response to the June 2008 Digital Dividend Review consultation document.
 - **United for Local Television (ULTV):** Support inclusion of a protection clause in non-DTT licences, but do not see a useful purpose in including a protection clause in DTT licences if technical licence conditions are framed adequately.

Question 2: Do you have any comments on our approach to technical licence conditions for the 600 MHz band and geographic interleaved spectrum?

- 2.4 Several stakeholders supported the need for guard bands to facilitate non-DTT, in particular mobile, use of the 600 MHz band. Everything Everywhere raised a specific concern with the proposal for an 8 MHz guard band to protect DTT from mobile

services irrespective of power levels. They do not support guard bands in excess of those provided in CEPT reports. Other stakeholders sought additional detail on our proposals before they could comment further.

- 2.5 In relation to the use of Spectrum Usage Rights (SURs), the BBC considered it difficult to see how a simple SUR approach would facilitate a technology neutral award. One confidential respondent supported the use of SURs whilst another was not in favour of their use.
- 2.6 Other specific comments in response to this question were:
- **Cobham Technical Services & IBN:** Protection from mobiles should extend to all services in adjacent bands not just DTT.
 - **Confederation of Aerial Industries & Mr B Copsey:** Comprehensive out of band and spurious limits in line with existing broadcast limits must be observed. Consideration of proposed power limits on existing communal aerial and cable networks must be a priority.
 - **Intellect:** A European harmonised approach would provide a powerful framework if non-broadcasting applications are advocated in the 600 MHz band. In interleaved spectrum it may be more difficult to resolve in-band interference to DTT services from new services. As a result, it may be more appropriate to allocate interleaved spectrum to services that exhibit similar characteristics to mainstream DTT services.
 - **Name Withheld:** Cannot see how the re-use of this band will protect domestic reception when wide band aerials and amplifiers have been used to enable digital TV reception.
 - **Samsung:** In the 600 MHz band, further frequency separation for mobile transmitters may not resolve difficulties. In interleaved spectrum, it might be appropriate to allocate spectrum to services that exhibit similar characteristics to mainstream DTT services.
 - **Scottish Government & Scottish Screen:** Question whether there is a need to separately assess technical considerations in Scotland, for example in extremely sparsely populated areas where transmission densities are likely to be low.
 - **United for Local Television (ULTV):** Propose that Community Multiplex licence applicants put forward their own technical plans as part of the licence award process.

Question 3: Do you have any evidence using frequency offsets with DVB-T2 EC signals might have an adverse impact on uses of adjacent interleaved spectrum?

- 2.7 Stakeholders did not present any evidence of adverse impact. Those stakeholders who did express a specific view on this question considered that the impact would be negligible (Arqiva and JFMG) or that DVB-T2 signals with frequency offsets may have a lesser impact on adjacent channels than DVB-T signals with frequency offsets (BBC).

Question 4: Do you have any evidence mobile services using the 600 MHz band and geographic interleaved spectrum could cause harmful interference to cable television?

2.8 Although no specific new evidence was put forward, a number of stakeholders highlighted that work on the 800 MHz band suggests a possibility of interference from mobile transmitters to customer-premises equipment. In light of this it was suggested that Ofcom undertake further work to assess this issue for the 600 MHz band.

Question 5: Do you have any comments on protecting PMSE in channel 38?

2.9 The main comments from stakeholders in response to this question were:

- **Arqiva, ULTV:** PMSE currently co-exists with broadcasting without broadcasting adopting any special measures to protect PMSE and so there should be no special requirements on DTT use in channels 37 or 39 to protect PMSE in channel 38.
- **Arqiva, JFMG:** The only constraint that needs to be applied to these channels is that they must not be offset towards channel 38.
- **BBC:** PMSE in channel 38 should have a similar degree of protection to that currently enjoyed by channel 69. Channel 38 is potentially vulnerable to interference from new services in channel 37 and channel 39.
- **BEIRG, Confederation of Aerial Industries, Mr B Copsey and Mr M Platt:** There should be guarantees that PMSE in channel 38 will be protected from interference.

Question 6: Do you have any comments on non-technical licence issues and the way we propose to approach them?

2.10 The main comments from stakeholders in response to this question were:

- **Arqiva, Channel 4, Five:** Ofcom should mandate interoperability between existing DTT multiplex operators and new operators.
- **BT:** DTT-multiplex ownership restrictions in respect of broadcasting bodies should be maintained.
- **Cobham Technical Services/IBN:** The social benefits of services should be considered when considering bid proposals.
- **Scottish Screen:** Agree in principle with Ofcom's proposals but not convinced that indefinite licence term or tradability is the best way to deal with spectrum in Scotland.
- **ULTV:** Suggest that long term licences help to protect the independence of service providers. Also comment on interoperability and Electronic Programme Guides.
- **Voice on the Net Coalition Europe:** Ofcom should maintain service and technology neutrality

Question 7: Do you have any comments on our assessment of the most likely uses of the 600 MHz band and geographic interleaved spectrum? Are there any potential uses we have not mentioned that should be considered?

The following suggestions were made by stakeholders about the likely use of 600 MHz and geographic interleaved spectrum:

- **Arqiva:** DTT and (to a lesser extent) mobile TV are the most likely uses of the 600 MHz band. Mobile broadband appears to be of limited commercial relevance as there is no harmonised European approach for this band or standardisation of equipment.
- **BT:** DTT is the most likely use of the 600 MHz band. Mobile broadband is not one of the most likely uses. Question whether a harmonised 600 MHz allocation can be achieved across Europe for emergency service use.
- **Channel 4:** This spectrum is uniquely suitable for DTT broadcasting. All other potential applications identified can be operated in other bands. Recommend that the spectrum be designated for HD DTT services.
- **Cobham Technical Services:** Fixed broadband wireless access
- **Ericsson:** Need a low-power cellular DTT system in interleaved spectrum below 698 MHz.
- **Five:** Do not believe that there is any demand for further DTT services on a free-to-air basis.
- **Institute of Local Television:** Local TV.
- **Intellect:** Use of the spectrum should be considered in the context of Government objectives for mobile broadband
- **JFMG:** Favour a combined award for the 600 MHz and geographic interleaved spectrum where DTT is the preferred application and PMSE is enabled in the white spaces.
- **MG Alba:** DTT, radio and mobile broadband.
- **Samsung:** Broadband wireless access in interleaved spectrum.
- **Scottish Government:** Local TV, mobile broadband and smart grids.
- **Scottish Screen:** DTT and mobile broadband.
- **Everything Everywhere:** Without harmonisation vendors will not be able to produce mass market terminals for the 600 MHz band at an acceptable cost. 600 MHz and geographic interleaved spectrum should be reserved to facilitate a harmonised solution suitable for mobile use in the future.
- **ULTV:** Unlikely to be demand for this spectrum for applications which are not harmonised with Europe. Most likely that this spectrum will be demanded for broadcast applications and on a secondary basis for PMSE and 'white space' devices.

Question 8: Are there any distinctive considerations and uses for this spectrum in the nations and regions of the UK?

- 2.11 **Arqiva:** Maximum value from 600 MHz band will be derived from making the spectrum available on a UK-wide basis. Additional services for the nations should be possible using the geographic interleaved spectrum.
- 2.12 **Institute of Local Television:** The spectrum should be used to deliver a seventh DTT multiplex in Scotland.
- 2.13 **Intellect:** Releasing the spectrum with geographic constraints will reduce interest from commercial users.
- 2.14 **Scottish Government:** Potential provision of two additional DTT multiplex in Scotland using geographic interleaved spectrum.
- 2.15 **ULTV:** Award the 600 MHz band UK-wide with universal-coverage obligations. Consider socially valuable applications when awarding the geographic interleaved spectrum.

Question 9: Do you have any comments on our continued inclusion of channel 36 in the award of the 600 MHz band?

- 2.16 Stakeholders expressed broad support for inclusion of channel 36 in the 600 MHz award rather than an early separate award of channel 36. One confidential respondent favoured channel 36 being split from the rest of the award.

Question 10: Do you have any comments on our intention to maintain a market-led approach to awarding the 600 MHz band and geographic interleaved spectrum?

- 2.17 A number of respondents (**BBC, Channel 4, Cobham Technical Services, IBN, Five, Institute of Local Television, JFMG, MG Alba, Scottish Government and three confidential respondents**) expressed some concerns with a purely market based approach, suggesting that this may fail to take account of public policy objectives and social benefits from use of the spectrum. Other comments in response to this question were:
- **Arqiva:** Given the suitability of this spectrum for DTT, encourage Ofcom not to overcomplicate the award design in an attempt to accommodate applications that have little commercial likelihood of being deployed.
 - **BT, Intellect:** Agree with market-led approach.
 - **Scottish Screen:** Need a full analysis of potential uses in Scotland.
 - **ULTV:** Concerned that spectrum will be hoarded or supply restricted by DTT-multiplex operators.
 - **Voice on the Net Coalition Europe:** Introduction of more licence exempt spectrum and spectrum trading is the best way to increase efficiencies in the management of spectrum.

Question 11: What information can you provide on packaging and award design considerations?

2.18 The following comments were made on packaging and award design:

- **Arqiva:** Suggest a combined auction for the cleared 600 MHz and geographic interleaved spectrum with packaging and award design arrangements that facilitate two UK-wide multi-frequency DTT networks.
- **BT, Cobham Technical Services, IBN:** Recommend a combined auction with 8 MHz lots.
- **Channel 4:** Auction design should allow bidders to assemble sufficient spectrum to enable the provision of a DTT multiplex.
- **Consumer Focus Scotland:** Some of the spectrum should be released to benefit consumers who have been disadvantaged in the development and roll out of digital technologies/services to date - eg rural Scotland.
- **Institute of Local Television:** Allow a seventh DTT multiplex in Scotland able to carry local TV.
- **Intellect:** Offer 5 and 8 MHz lots and allow flexibility for bidders to aggregate sufficient bandwidth.
- **JFMG:** The best way for packaging and award design to benefit PMSE users is for it to be done in a way that supports DTT as a primary user of the spectrum.
- **Samsung:** 5 MHz lots would be consistent with mobile broadband technologies likely to be deployed in the future.
- **Scottish Screen:** Ofcom should not package awards in a way that does not allow Scotland to make best use of the spectrum.
- **Everything Everywhere:** Ofcom should reserve this spectrum to facilitate a harmonised solution for the future.
- **ULTV:** Likely to oppose any award design that is intended to encourage the combination of larger geographic interleaved lots into a quasi-UK multiplex as this would mean only 'scraps' are left for local TV.

Question 12: When would you like to start operating new services using the 600 MHz band and/or geographic interleaved spectrum?

- **Arqiva:** Key uncertainties, in particular WRC-12 and European Union plans for greater spectrum co-ordination need to be addressed first, therefore appropriate timing for an award would be late 2012 or into 2013. This would also be consistent with the timing of 600 MHz spectrum clearance and its availability for new service deployment.
- **BT:** At least 12 months after an award
- **Channel 4:** Shortly after an award and co-incident with the end of digital switchover and channel 61/62 clearance.

- **Cobham Technical Services/IBN:** 2 years after licence issue on a staged roll-out.
- **Institute of Local Television:** 2012, assuming a prior assessment of the scope of regional Channel 3 licences in Scotland.
- **Intellect:** Suggest an early award.
- **ULTV:** Award the spectrum as soon as possible.

General comments not covered by specific questions

- 2.19 **Arqiva:** Believe that the 600MHz spectrum is critical to the long term sustainability and development of the Digital Terrestrial Television platform – without this spectrum the platform will have little scope to innovate, to launch more HD channels and new services such as 3DTV, and ultimately remain competitive.
- 2.20 **BEIRG:** Ofcom must not negate their ability to redress any shortfall in current or future spectrum availability for PMSE. Ofcom must not make any final decisions until the white space maps are published.
- 2.21 **BT:** Priority should be to make this spectrum available for additional DTT services at the earliest opportunity, whilst not precluding other possible uses. An auction in the first few months of 2011 would be optimal.
- 2.22 **Channel 4:** Concerned that potential users such as PSBs will not be able to compete against rival bidders in a commercial auction. Ofcom's decision to clear the 800 MHz band of DTT services strengthens case for Ofcom to review its approach to the 600 MHz spectrum.
- 2.23 **Confederation of Aerial Industries:** Believe that an impact assessment is essential to take account of the costs of resolving interference issues. Provision of filters/replacement equipment should be proactive not reactive. If block edge masks are used then they must protect existing users. Advise that there are 10 million people receiving signals via cable/communal system.
- 2.24 **Consumer Focus Scotland:** Ofcom should carry out research to find out directly from consumers what they want spectrum used for. Some spectrum should be guaranteed for disadvantaged consumers in rural Scotland.
- 2.25 **Mr Brian Copsey:** No consideration (or very little) of interference issues were considered in CEPT work on the 790-862 MHz allocation. A full impact assessment which considers the full cost of replacing, filtering or re-engineering existing users must be carried out. If block edge masks are used they must ensure full protection of existing users.
- 2.26 **Ericsson, Qualcomm:** Suggest that the 698-790 MHz band could become a 'second Digital Dividend' and possibly harmonised within CEPT and Regions 2 and 3. This would result in the upper broadcast channel being channel 48 with a guard band of 694-698 MHz.
- 2.27 **Mr Peter Kerry:** With the change to digital there will be need for domestic distribution amplifiers to provide services to all TVs in a house. This together with poor quality cabling is likely to result in interference to reception.

- 2.28 **MG Alba:** MG Alba's priority remains to secure carriage for BBC Alba on gifted spectrum as digital switchover progresses in Scotland. Believe that carriage should be made available to them in a similar way as has been done in Northern Ireland.
- 2.29 **Mr Matthew Platt:** A full impact assessment should be done before any further decisions are made.
- 2.30 **Everything Everywhere:** Propose that 600 MHz and geographic interleaved spectrum be reserved to facilitate a harmonised solution suitable for mobile use in the future.
- 2.31 **United for Local Television (ULTV):** ULTV advocate the creation of a new 'Community Multiplex licence', to be awarded by a comparative selection process to non-profit-distributing companies. They propose that geographic interleaved spectrum should be reserved for such licences and that these licences could be used for local TV purposes. ULTV present a number of arguments in favour of these proposals including a critique of Ofcom's market-led approach to spectrum management. They also discuss how such proposals might be implemented in practice, including consideration of award criteria and technical licence conditions. They additionally propose a Channel 6 network, developed as a federation of independent local TV franchises.

Section 3

Next steps

Structure and timing of award

- 3.1 In considering how and when to move forward with an award, a key initial question is whether to award the 600 MHz spectrum separately from the geographic interleaved spectrum, or to award the 600 MHz and geographic interleaved spectrum at the same time in a combined award.
- 3.2 One of the potential uses of the 600 MHz and geographic interleaved spectrum is the provision of local TV services. The Government is currently reviewing local TV policy and has informed us that it will not direct us to reserve 600 MHz for local TV. However, it has not yet ruled out this possibility in respect of the geographic interleaved spectrum. As a result, a combined award could be significantly delayed because it would have to await the conclusion of the review.
- 3.3 This suggests that it may be advantageous to move forward with a standalone award of 600 MHz spectrum as soon as possible because we are likely to be able to hold this significantly earlier than a combined award. As a result, consumers would benefit as soon as possible after digital switchover from use of the spectrum for new services.
- 3.4 On the other hand, there will be benefits from holding a combined award if there are strong complementarities between 600 MHz and geographic interleaved spectrum. In that case, it might be better to wait and award 600 MHz and the geographic interleaved spectrum together. We have not yet reached a final view on whether to combine the awards but will discuss further with stakeholders to help us understand better the costs and benefits of the alternatives.
- 3.5 Other key issues we are considering involve the design of the award and the technical specification of the spectrum rights to be awarded.

Next steps

- 3.6 Our immediate next step in preparing for an award is to publish more detailed proposals on award design, taking account of the further analysis we are carrying out, responses received to our February 2010 consultation and, where appropriate, previous digital dividend consultations in 2008. Our current plan is to move to this further consultation as soon as practical.
- 3.7 If we were to proceed with a relatively straightforward award of 600 MHz spectrum alone, our current view of the subsequent steps and their indicative timings would be:
 - Q1 2011: Publish consultation document on the detailed award design.
 - Q3 2011: Publish statement on the award design, Information Memorandum and Notice of proposal to make regulations.
 - Q3/4 2011: Make regulations for the award.
 - Q4 2011: Invite applications and hold award.

600 MHz and geographic interleaved spectrum

- 3.8 A more complex award combining 600 MHz and geographic interleaved spectrum could delay the award significantly.

Annex 1

Respondents to consultation

A1.1 The following stakeholders submitted responses to our February 2010 consultation:

- Arqiva
- BBC
- BEIRG
- BT
- Channel 4
- Cobham Technical Services
- Confederation of Aerial Industries
- Consumer Focus Scotland
- Copsey, Mr B
- Ecclesine, Mr P
- Ericsson
- Five
- IBN
- Institute of Local Television
- Intellect
- JFMG
- MG Alba
- Platt, Mr M
- Qualcomm
- Read, Mr P
- Samsung Electronics
- Scottish Government
- Scottish Screen
- T-Mobile/Orange Joint Venture

600 MHz and geographic interleaved spectrum

- United for Local Television (ULTV)
- Voice on the Net Coalition Europe

A1.2 Full copies of all non-confidential responses are available on the Ofcom website⁴.

⁴ See http://stakeholders.ofcom.org.uk/consultations/600mhz_geographic/?showResponses=true