



## Second consultation on coexistence of new services in the 800 MHz band with digital terrestrial television

Consultation

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## Section 1

# Executive summary

- 1.1 On 12 January 2012, we published a second consultation setting out our revised proposals for the auction of the 800 MHz and 2.6 GHz spectrum<sup>1</sup>. This will be the largest ever single auction in the UK of internationally harmonised mobile spectrum.
- 1.2 Historically the 800 MHz spectrum band (790-862 MHz) has been used for terrestrial television broadcasting. However, as a result of digital switchover (DSO), and more recently the clearance of channels 61 and 62, this spectrum has been made available for new mobile services.
- 1.3 The current generation of TVs, set top boxes and equipment used to receive digital terrestrial television (DTT) was designed to receive signals across the whole TV band, including the 800 MHz spectrum. This means that when mobile services begin transmitting in the band, there will be the potential for interference from mobile base stations. This could affect the ability of some people to receive DTT.
- 1.4 On 2 June 2011, we published a consultation setting out our initial proposals for managing coexistence between new mobile services in the 800 MHz band and existing DTT services<sup>2</sup>.
- 1.5 We received 40 responses to the consultation. We considered these carefully and undertook a variety of further work as a result of the comments made by respondents. This included updating our technical and costing models and commissioning consumer research to investigate consumer's ability to self install DTT receiver filters.
- 1.6 Our updated technical analysis shows that without action to mitigate the interference, approximately 2.3m households may lose the ability to access DTT services, either partially or completely. Approximately 40% of households in the UK use DTT as their primary means of accessing TV, so around 900,000 DTT-only households could be affected. This would mean those households losing some or all of their TV channels.
- 1.7 Our June 2011 consultation noted that some decisions raised questions of public policy and as such were for Government to take rather than Ofcom. To assist the Government in taking its decisions we provided updated analysis on the impacts and costs of options for mitigating DTT coexistence issues.
- 1.8 The Government has now taken policy decisions relating to DTT coexistence:
  - A single implementation body (referred to as 'MitCo') will be set up to manage the delivery of DTT interference mitigation and provide support to DTT consumers. This will be led by the new 800 MHz licensees.
  - MitCo will be provided with funding of £180m. This money is expected to come from the new 800 MHz licensees. Government will bear the risk of any overspend

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<sup>1</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/summary/combined-award-2.pdf>

<sup>2</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/summary/dttcondoc.pdf>

and there will be a 50:50 gainshare of any underspend between new licensees and Government when MitCo is closed down.

- MitCo will provide support to DTT consumers. This will include information and providing DTT receiver filters to households proactively and reactively. Platform changes will also be offered to households where filters do not solve the issue of interference.
- A Supervisory Board will be established to monitor MitCo's performance, and to advise Ofcom accordingly.
- Additional support will be provided to vulnerable consumers, including installation support; approximately £20m of the £180m fund is intended to cover the cost of this support.

1.9 This consultation focuses on options for implementing the Government's decisions. In particular, it covers:

- When and how MitCo should be established.
- How the Supervisory Board might be established.
- How the gainshare should be split among new 800 MHz licensees when MitCo is shut down.
- Managing MitCo (through the 800 MHz licensees) using a set of KPIs to ensure MitCo delivers the level of consumer support requested by the Government to a high standard.
- A set of operational conditions that new licensees will automatically have to implement should they, through MitCo, breach any of the KPIs.
- The process for close down of MitCo and managing interference afterwards.

1.10 This document sets out for consultation a number of proposals on which we are inviting stakeholder comments. In particular, whilst this consultation document contains a number of specific questions, we are not seeking to limit the issues on which respondents may wish to comment. Respondents are invited to include representations on any issues which they consider to be relevant. Stakeholders should note that although in a number of places we set out a preference for certain options, we are actively considering all options included in this document.

1.11 It is our intention to publish a statement on these issues in the summer when we make decisions about the award of the 800 MHz and 2.6 GHz spectrum and publish an Information Memorandum in relation to that award.

## Section 2

# Introduction

## Background and purpose of this document

- 2.1 We published a consultation document on 2 June 2011 setting out our initial proposals for managing coexistence between new services in the 800 MHz band and digital terrestrial television (DTT coexistence)<sup>3</sup>.
- 2.2 The consultation closed on 11 August 2011. We received 40 responses to this consultation and the non-confidential responses have been published on our website<sup>4</sup>. We have carefully reviewed these responses and we summarise them and where relevant provide a response to the main points raised in Section 4 of this document.
- 2.3 In our consultation we noted that some policy questions, for example the level of consumer support that should be offered and the functions and duties of MitCo and how it is created, would need to be the subject of further detailed work and research before we could make firm proposals. In addition, we have undertaken further work in response to the comments of stakeholders in their responses. We have now completed the majority of this further work and present it in this document, including:
  - 2.3.1 research to investigate the ability of consumers to self-install DTT receiver filters (summarised in Section 4, with full details in the report from our consumer research partners Essential and SPA Future Thinking published on our website<sup>5</sup>);
  - 2.3.2 further technical sensitivity analysis (presented in Section 5 and the technical report that accompanies this document<sup>6</sup>);
  - 2.3.3 further work looking at the costs of consumer based and network based mitigation (summarised in Section 6 and described in detail in a report from our consultants Deloitte published on our website<sup>7</sup>);
  - 2.3.4 further work on the detailed design and implementation of MitCo (presented in Section 7);
  - 2.3.5 further amplifier measurements (presented in a technical study by ERA published on our website<sup>8</sup>) and further investigation of alternative DTT receiver filter technologies.
- 2.4 We also noted in our consultation that some of the decisions raised questions of public policy and as such were properly for Government to take rather than Ofcom.
- 2.5 Government has now taken policy decisions related to DTT coexistence. These decisions are set out in Section 3 of this document.

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<sup>3</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/summary/dttcondoc.pdf>

<sup>4</sup> <http://stakeholders.ofcom.org.uk/consultations/coexistence-with-dtt/?showResponses=true>

<sup>5</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

<sup>6</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

<sup>7</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

<sup>8</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

## Award of the 800 MHz band

- 2.6 The policy decisions and proposals in this document are directly relevant to the award of 800 MHz spectrum. We published a second consultation on future mobile competition and proposals for the award of the 800 MHz and 2.6 GHz spectrum on 12 January 2012<sup>9</sup>. The information in this document on DTT coexistence complements the proposals set out there. We expect to make a final policy statement on both the main award proposals in the 12 January consultation and the outstanding DTT coexistence issues described here in Summer 2012.

## Approach to coexistence in some other European countries

- 2.7 We noted in our June 2011 consultation that some European countries had already awarded 800 MHz spectrum and made decisions on DTT coexistence. Since then other European countries have also published proposals or undertaken further work related to DTT coexistence. We describe some of these developments below:

### France

- 2.8 A trial to assess the risk of interference to reception of DTT from LTE signals has been completed in France. Trials were initially carried out in a rural environment in January 2011, followed by further trials in an urban environment between September and October 2011.
- 2.9 The trials employed eight LTE base stations operating at maximum power. During the trials, high definition DTT services were transmitted on Channel 60. A call centre for collecting complaints of interference was set up. Letters were also distributed to households to inform occupants of the trials and to provide details of who to contact if they experienced interference to their DTT reception.
- 2.10 According to the report on the trial published on the French regulators' website<sup>10</sup>, approximately 2.3 households per thousand reported interference to their DTT reception. This figure is lower than the numbers predicted to be affected in the theoretical modelling. The report acknowledges however that some households might not have reported interference for various reasons, e.g. because of the limited length of transmissions, and concluded that the percentage of households that would report interference when LTE is operating continuously would be higher.
- 2.11 We understand that the French regulator has not proposed to include additional technical licence conditions in 800 MHz licences over and above the conditions agreed in Europe. However, they have placed responsibility for addressing, and funding measures to address, interference on the 800 MHz licensees. Licensees are required to take all necessary measures in the event of interference, either by stopping the transmissions causing the interference or by using other appropriate means.

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<sup>9</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/summary/combined-award-2.pdf>

<sup>10</sup> <http://www.anfr.fr/fr/planification-international/etudes/compatibilite/bande-800-mhz.html>

## Denmark

- 2.12 The Danish Telecommunication Authority (formerly the National IT and Telecom Agency) recently launched a public consultation on the 800 MHz auction in Denmark. The auction is planned for the summer of 2012.
- 2.13 To help minimise potential interference to DTT services, the Danish Telecommunication Authority has proposed technical restrictions in the 800 MHz licences.
- 2.14 The technical restrictions would apply to the licensee using the lowest frequency block (791 – 801 MHz). In geographic areas where DTT services use channels 59 and 60, a maximum EIRP limit would be set at a value between 30 – 62 dBm. In certain areas, no base stations would be permitted to use the lowest frequency block. In areas where DTT channels 59 and 60 are not used, the maximum allowed EIRP proposed is 62 dBm<sup>11</sup>. The licensee would also be subject to lower out-of-band emission limits.
- 2.15 The aim of the restrictions is that all consumers who have a ‘proper’ home installation<sup>12</sup> will continue to be able to use the DTT platform. Full details of the auction of the 800 MHz spectrum in Denmark can be found on the Danish Telecommunication Authority’s website<sup>13</sup>.

## Sweden

- 2.16 In Sweden, the auction of the 800 MHz spectrum was concluded in March 2011 and the deployment of LTE mobile services in the band is currently underway.
- 2.17 Licence conditions were included in the 800 MHz licences in Sweden to manage interference to television services. This included a requirement that the 800 MHz licensees must not cause interference to terrestrial television. In the event that interference occurs, the 800 MHz licensees are responsible for determining whether one of the licence holders has caused the interference, and the licence holder deemed responsible would then need to take steps to resolve the interference. The new 800 MHz licensees are also responsible for setting up and managing a help desk to provide consumer support to DTT viewers.
- 2.18 Full details of the licence conditions included in the 800 MHz licences in Sweden can be found on the PTS website<sup>14</sup>.

## Conclusion

- 2.19 It is apparent that other European countries are adopting a range of different approaches and techniques for managing coexistence between mobile services and DTT consumers. It is worth noting however that all countries discussed above do

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<sup>11</sup> The proposed maximum EIRP in the UK across a 10 MHz block is 64 dBm, see paragraphs 4.46-4.49 for more details.

<sup>12</sup> A proper home installation is defined as one that includes the use of: a good quality TV or set-top box; a DTT receiver filter; an antenna installation without components giving rise to separate issues, e.g. antenna amplifiers.

<sup>13</sup> <http://en.itst.dk/spectrum-equipment/Auctions-and-calls-for-tenders/800-mhz/public-consultation-over-draft-800-mhz-auction-documents>

<sup>14</sup> <http://www.pts.se/en-gb/Documents/Decisions/Radio/2011/Decision-on-the-assignment-of-licenses-in-the-frequency-band-791-821832-862--dnr-10-10534/>

consider it necessary to include some additional conditions in licences to minimise harmful interference into DTT services.

## Structure of this document

2.20 The rest of this document is structured as follows.

- In Section 3, we describe and explain the decisions taken by Government on DTT coexistence;
- In Section 4, we summarise responses to our June 2011 consultation and provide our view on the main issues raised;
- In Section 5, we describe the further technical work we have undertaken and present our updated technical modelling results;
- In Section 6, we explain the implications of Government decisions for the management and mitigation of interference and the provision of consumer support;
- In Section 7, we present our detailed proposals for implementing Government decisions relating to MitCo implementation and design;
- In Section 8, we explain how proposals for implementing MitCo will be translated into licence conditions for new 800 MHz spectrum licences.

## Impact Assessment and Equality Impact Assessment

2.21 This document as a whole comprises an impact assessment.

2.22 In our June 2011 consultation, we noted that we had undertaken an Equality Impact Assessment (EIA) and that this would need to be updated as work progressed. We provisionally identified that the proposals in that document may have a particular impact on elderly and disabled people insofar as being able to implement potential consumer-based mitigation techniques. We noted that a key decision for these groups would be with respect to the level of support provided to consumers.

2.23 Government has now made a decision on the level of support that will be offered to consumers, including for elderly and disabled people. This decision is set out in Section 3. We have updated our EIA to reflect this decision and to incorporate the new information presented in this document and in the accompanying consumer research.

## Section 3

# Government decisions

## Introduction

- 3.1 Certain policy decisions associated with DTT coexistence are matters of public policy and are therefore properly for Government to take.
- 3.2 Government has reviewed the technical and cost analysis presented in our June 2011 consultation and the updated technical and cost analysis undertaken since then, including that set out in this consultation document and in the accompanying Deloitte report. Based on this, Government has now made decisions in several key DTT coexistence policy areas including:
- 3.2.1 The level of, and eligibility for, support provided to DTT consumers;
  - 3.2.2 Additional support for vulnerable consumers;
  - 3.2.3 Limits on the number of consumers losing DTT services and/or TV services;
  - 3.2.4 The ownership, operational responsibility and oversight of MitCo;
  - 3.2.5 The funding of MitCo.

## Decisions taken by Government

### The level of, and eligibility for, support provided to DTT consumers

- 3.3 In our June 2011 consultation, we proposed that consumer-based mitigation, in particular DTT receiver filters, would be the primary method used for mitigating interference from new mobile services. Our latest technical analysis has reinforced the importance of this technique.
- 3.4 In providing consumer-based mitigation, there is a range of levels of consumer support that could be envisaged. The Government has made decisions on the level of support that should be offered. Specifically it has decided that the following support elements should be provided:
- Information and advice to DTT consumers, including but not limited to:
    - provision of information in advance of new network switch-on to households predicted to be affected;
    - a contact centre and an online portal to provide consumers with clear information and advice and to arrange provision of DTT receiver filters and other support as appropriate;
  - DTT receiver filters and written guidance to DTT consumers. These will be provided proactively (i.e. in advance of new network switch-on) to the majority of DTT consumers who are predicted to be affected by interference, and reactively to those consumers who do not receive a filter in advance but still experience interference;

- Platform changes, i.e. the provision of a broadly equivalent satellite or cable television or cable TV service, where the correct installation of a receiver filter does not mitigate the interference problem<sup>15</sup>. When a platform change is required, the general aim will be to provide the consumer with an equivalent equipment level to that which was used by the consumer to receive the DTT service.
- 3.5 Only one filter will be provided per household. This means that, where interference is experienced on other sets in addition to the main TV set, the consumer will need to obtain an additional filter (or filters) themselves. Government has however requested that there is a clear and straightforward route for consumers to obtain additional filters where these are needed.
- 3.6 Government has decided that, for most consumers, installation support for fitting receiver filters will not be provided (support for vulnerable consumers is discussed later). In taking this decision, they note that the consumer research commissioned by Ofcom, and published alongside this consultation, supports the view that most consumers should be able to fit receiver filters without assistance. As noted above, a clear set of instructions and guidance will be provided to assist consumers in doing so. Installation support will however be provided to consumers who require a platform change.
- 3.7 Government has also decided that the focus of support should be for consumers whose primary means of receiving TV is DTT (primary DTT households). The same level of support will be offered in relation to both public service broadcasting (PSB) and commercial (COM) multiplex reception issues.
- 3.8 Other than information provision, support will generally not be offered in instances where:
- the consumer already has access to cable and/or satellite TV services;
  - a set-top aerial is used to receive the DTT service;
  - the interference occurs due to the proximity of mobile handsets to the TV equipment;
  - the interference is in relation to cable TV equipment;
- 3.9 Government has requested that, where possible, suitable information and guidance be provided to all consumers affected in the ways listed above so that they know what actions they can take to help themselves.
- 3.10 We note that, while the focus of support will be for primary DTT households, in practice many other consumers will receive information by virtue of being located in areas where interference is predicted to occur. In addition, many of these consumers may also receive a filter by virtue of the Government's decision that in advance of new network switch-on, filters should be provided to all consumers in areas which are likely to be most affected, as it is unlikely to be possible accurately to target primary DTT households only.

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<sup>15</sup> This is only expected to occur in a very limited number of cases, see Sections 5 and 6 for more detail.

### **Additional support for vulnerable consumers**

- 3.11 Government has decided that additional support will be provided to vulnerable consumers. In addition to the support provided to consumers in general as described in paragraph 3.4, vulnerable consumers will be eligible to receive installation support to help them fit filters. Eligibility for this support will be based on the same criteria as is being used for digital switchover (DSO).

### **Limits to the loss of DTT and television services**

- 3.12 Without mitigation, a large number of households could be expected to lose or suffer degraded reception of DTT services. Government's decision to provide the level of consumer support described above will maintain or restore reception of DTT services for most of these households.
- 3.13 Our technical modelling results (presented in Section 5) indicate that there will be a small number of households for whom a DTT receiver filter will not restore DTT reception. For these households Government has decided to offer platform changes. Government has also decided that there should be an overall limit on the number of households that can be offered a platform change. It has not set a specific number for the limit at this stage; rather, the limit will be kept flexible until there is greater clarity on the scale of the problem. We discuss options for how this limit might work in Section 7.
- 3.14 Out of the small proportion of the households who require a platform change, an alternative platform may not be available<sup>16</sup>. This is estimated to be around 3% of the houses who need a platform change. Government has decided that such households should receive additional assistance to restore some form of TV service. Up to £10,000 per affected household would be made available to provide this additional assistance.

### **The constitution, establishment and oversight of MitCo**

- 3.15 Government has decided that an organisation (referred to as "MitCo") should be established to coordinate and undertake the provision of consumer support. It has decided that this organisation should be jointly owned and operated by the new 800 MHz licensees. Government expects that MitCo will be subject to a set of clear key performance indicators (KPIs) and that a process will be put in place to enable effective action if these KPIs are not met.
- 3.16 A Supervisory Board will be established to oversee the activities and performance of MitCo. The Supervisory Board will initially include representatives from Government, Ofcom, broadcasters and multiplex operators, new 800 MHz licensees and consumer groups. It will be established by Government and funded using the same funds allocated for MitCo.
- 3.17 Government has suggested that MitCo will need to be established in advance of the auction to enable sufficient time to prepare for new network roll-out and provision of support to DTT consumers. Government has not commented on the detail of how this should happen and we present some options in this regard in Section 7.

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<sup>16</sup> Some households may not be able to access satellite or cable services nor have a good enough broadband connection to receive IPTV.

- 3.18 Government has also suggested that MitCo should remain in existence until one year after network roll-out is complete, but with a backstop date of 2017. This is something it would expect the Supervisory Board to keep under review.

### **The funding of MitCo**

- 3.19 Government has decided that £180m should be provided to MitCo to fund its work to mitigate interference into DTT from use of the 800 MHz band. Approximately £20m of the £180m fund is intended to cover the cost of providing additional support to vulnerable consumers. Government has also decided that this funding will be sourced from the successful bidders for the 800 MHz licences, but the exact mechanism for doing so is still to be agreed with HM Treasury. We discuss this in more detail in Section 7.
- 3.20 If the total outturn cost of funding MitCo and its operations exceeds £180m, Government will bear the risk of any overspend.
- 3.21 If the total outturn cost of funding MitCo is less than £180m, the remaining funds will be shared between Government and the 800 MHz licensees. These funds will be split 50:50 between Government and the 800 MHz licensees.
- 3.22 We set out our proposals for how the funding and gainshare may be split between new licensees in Section 7.

## Section 4

# Responses to the first consultation

## Introduction

4.1 In our June 2011 consultation, we asked the following questions:

*Consultation question 1: Do you have any comments on our modelling approach and assessment of numbers of households affected?*

*Consultation question 2: Do you agree with our high level conclusions on mitigation options?*

*Consultation question 3: Do you have any comments, views or evidence that you would wish to be considered in our further work looking at the appropriate level of consumer support?*

*Consultation question 4: Do you have any comments or views on how we have assessed the approaches and our preference for the hybrid approach?*

*Consultation question 5: Do you agree with the options, the assessment approach and our initial conclusions? What are your views on cost risks and how to deal with them?*

4.2 We received 40 responses to the June 2011 consultation. All of these, apart from 5 confidential responses, can be found on our website<sup>17</sup>.

4.3 In this section, we review and respond to these responses and describe what further work we have done to address certain points raised.

4.4 We have grouped responses received from stakeholders into several areas for discussion as follows:

- Approach to the protection of DTT
- Scale of the interference impact
- Mitigation options
- Costs of mitigation
- Consumer support
- MitCo
- Licence conditions
- Other comments

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<sup>17</sup> <http://stakeholders.ofcom.org.uk/consultations/coexistence-with-dtt/?showResponses=true>

## Approach to the protection of DTT

4.5 Some respondents said that our proposals did not go far enough to protect DTT and to consider the long term impact on DTT. Respondents were particularly concerned with:

- the potential disruption to DTT viewers
- the regulatory approach to protection
- the impact to the 98.5% coverage level
- the impact of platform changes on inter-platform competition

We address each point separately below.

### Disruption to DTT viewers

4.6 Several respondents commented that disruption to DTT viewers must be minimised and noted that this was in line with the DTT migration criteria set out by Ofcom in the statement on clearing the 800 MHz band<sup>18</sup>. They said that mitigation must be provided in advance to prevent interference to DTT rather than waiting until interference occurs and then dealing with it.

4.7 As set out in the previous section, Government has decided that information and DTT receiver filters should be provided proactively to households that are most likely to experience interference and has therefore decided that funding should be allocated for this purpose. This should minimise disruption to DTT viewers' experience. We set out how we expect this to work in practice in Section 7 of this document.

### Regulatory approach to protection

4.8 Some respondents said that this was the first time a UK regulator would licence a new service knowing that it would adversely affect an existing service, with some users of the existing service losing or suffering access to that service. They suggested that the appropriate starting point for Ofcom's analysis should be to assume that guard bands be used to protect DTT and any deviation from this would need to be properly justified.

4.9 We discussed the use of guard bands to prevent interference to DTT services in our June 2008 consultation on the detailed award design for DDR cleared spectrum<sup>19</sup>. As noted there, a specific design aspect of the DTT receivers that are currently in use means they can be susceptible to interference not just from transmissions in immediately adjacent frequencies (as is typical), but also from transmissions at much wider frequency separations. There are two reasons for this:

- i) the 'n+9' image channel problem, where DTT receivers with a superheterodyne tuner are susceptible to interference from services operating in frequencies 64 MHz away;

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<sup>18</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/800mhz/statement/clearing.pdf>

<sup>19</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/clearedaward/summary/condoc.pdf>

- ii) the blocking problem, where a DTT receiver becomes 'overloaded' (and stops working) due to the power of signals at its input exceeding a given threshold. A large proportion of the households predicted to be affected by interference will be affected by this problem. This problem is largely frequency independent and can occur at large frequency separations.
- 4.10 The guard bands required to prevent or significantly reduce the interference risk would in practice have to be very large and therefore spectrally inefficient. We concluded that a guard band approach would not fulfil our relevant duties in the most effective manner. Rather, the particular challenges of managing interference in this case meant that we needed to consider different and potentially novel approaches to coexistence.
- 4.11 We continue to believe that an approach which involves using a mix of mobile network-based and consumer-based mitigation as described in this document is the most likely to fulfil our relevant duties in this area, i.e. to secure the optimal use of the electromagnetic spectrum and to further the interests of citizens and consumers in relation to both existing DTT services and new mobile services in the 800 MHz band.

### **The impact to the 98.5% coverage level**

- 4.12 Some respondents said that the impact of interference could result in a reduction of PSB DTT coverage below 98.5% of UK households. It was suggested that Government and Ofcom statements issued to date have resulted in a legitimate expectation that a coverage level of 98.5% will be maintained.
- 4.13 To determine the likely effect that deployment of mobile services in the 800 MHz band will have on PSB coverage, we undertook further technical modelling. The modelling showed that with the use of consumer-based mitigation and a limited amount of mobile network-based mitigation, there would not be a significant change to the PSB coverage level. The modelling results are set out in Section 5 of this document.
- 4.14 In any event, however, we do not consider that there is a legitimate expectation that a coverage level of 98.5% for DTT will be maintained.
- 4.15 There are specific obligations in the PSB broadcasters licences that require the digital television service to be "equivalent to or, if and to such extent as Ofcom thinks fit, substantially the same as the coverage area that was achieved by the Analogue Licence[s]". These obligations stem from a requirement in section 215 of the Communications Act 2003 which provides that PSB broadcast licences must provide what "appears to Ofcom to be a service that is equivalent in all material respects to the service the provision of which in analogue form was authorised by the existing licence." In May 2004, we published a report which concluded that PSB analogue core coverage was 98.5%. We then used this figure as a benchmark when considering the future of the DTT network. There is however no explicit obligation for licensees to reach coverage of 98.5% of UK households.
- 4.16 Further, it is clear that our public policy statements in relation to the 98.5% coverage level are of a general nature, as opposed to being specific promises to a particular group of individuals. The statements have typically referred to the 98.5% coverage level as being (a) an aim, and (b) an approximate number. Furthermore, the PSB broadcasters' and multiplex licences contain provisions which specifically enable us to vary the terms, including those relating to coverage. This was reflected in a statement "Digital Replacement Licences offered to Channels 3,4,5 and Public

Teletext”<sup>20</sup> published on the 29 November 2004, where we noted that “Ofcom’s statutory duty to ensure that the DRL service of Channel 3 and 5 is ‘equivalent in all material respects’... is not absolute and is subject to Ofcom’s discretion to relax this requirement to allow the service to cover ‘substantially the same’ area.”

### **The impact of platform changes and inter-platform competition**

- 4.17 Some respondents thought that the use of platform changes as a mitigation measure would impact inter-platform competition. BT said that our proposals did not address how providers of Pay TV services over DTT would be compensated for the loss of customers due to interference.
- 4.18 Arqiva additionally suggested that both consumers and DTT spectrum users should be compensated in the event of a platform change.
- 4.19 We do not consider that our proposals give rise to any right to compensation on the part of providers of DTT services. In particular, we do not consider that such providers have any legitimate expectation as to the number of households who are capable of receiving DTT services.
- 4.20 Similarly, we do not consider that our proposals give rise to any right to compensation for consumers. However, Government has decided that consumers should be given some support in managing the DTT interference that they may suffer as a result of use of the 800 MHz band, details of which are set out in this document.
- 4.21 We note that our revised technical modelling results, presented in Section 5, indicate that only a small number of platform changes are likely be needed. DTT receiver filters should mitigate interference in the vast majority of cases. If no network-based mitigation was undertaken and only filters were used, approximately 15,000 primary DTT households might need a platform change. If a limited amount of network-based mitigation was undertaken and/or DTT receivers which are less susceptible to interference were provided, a much lower number of households might need a platform change.
- 4.22 In addition, Government has decided that there should be a limit on the overall number of platform changes that MitCo will be permitted to offer as a measure for restoring a households TV service, although the decision on the size of this cap will be taken later.
- 4.23 We therefore consider that in light of the very small number of households who are likely to need a platform change, the impact on inter-platform competition and/or a channel provider’s ability to generate advertising revenue from the DTT platform is likely to be negligible.

### **Scale of the interference impact**

- 4.24 A number of respondents thought that our technical analysis underestimated the interference problem and that it did not represent ‘worst case’ analysis. They thought that, in practice, a significantly higher number of households than we had predicted might be affected by interference. In addition, Digital UK thought that the analysis did not go far enough in assessing the consumer impact of the interference.

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<sup>20</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/drl/statement/drlstatement.pdf>

- 4.25 On the other hand, some respondents, including mobile network operators (MNOs), suggested that we had overstated the impact of interference. Vodafone and another respondent commented that there had been few cases of interference reported in European countries where the 800 MHz band has been awarded.
- 4.26 Many of the concerns that were raised regarding our approach referred to the particular technical parameters that we used in the modelling. The issues raised included:
- The use of the 59dBm EIRP value in the technical modelling was questioned. It was thought by some that a maximum EIRP value of 64dBm should be used as this reflects the maximum permitted power limit set out in the proposed technical licence conditions.
  - The assumptions on the number and location of base stations that were used were questioned. Respondents suggested the number of base stations deployed in practice could be significantly higher. Telefonica UK thought that the assumption that there would be full site sharing was unrealistic. They noted that this does not reflect experience to date with the roll out of 2G and 3G services.
  - Some respondents thought that we needed to undertake more amplifier testing. Digital UK, Arqiva and another respondent raised the issue that we were only able to test the performance of one amplifier. It was felt that this device may not be representative of the full range of installed devices.
  - A number of respondents requested that we undertake further detailed sensitivity analysis to determine the range of possible interference outcomes.
- 4.27 In response to the comments, we undertook a detailed review of the base case technical parameter values used in our modelling. We also carried out sensitivity analysis by investigating the effect of changing certain key modelling parameters. To assist us in this process, we held three further sessions of the Technical Working Group<sup>21</sup> to obtain feedback on our proposed approach and share the results of our revised modelling with stakeholders. We also commissioned further testing of a number of additional amplifiers selected to represent the range of domestic and commercial amplifiers available in the market.
- 4.28 Section 5 of this document summarises the further technical work that we have carried out, and the full analysis is presented in the accompanying technical report<sup>22</sup>.

## Mitigation options

- 4.29 We received a number of comments from respondents on the desirability or otherwise of using or mandating various mitigation techniques. We summarise some of these comments and provide our updated views on this area in Section 6.

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<sup>21</sup> The Technical Working Group (TWG) is an informal group set up by Ofcom to discuss technical issues relating to DTT coexistence. Meetings of the TWG were conducted via conference call. Regular attendees included representatives from broadcasters, multiplex operators, mobile network operators, TV and mobile equipment manufacturers, independent technical experts etc. The group first met on 13 May 2010 and on a fortnightly basis thereafter until March 2011. The group was reconvened for three further meetings following the first coexistence consultation published in June 2011.

<sup>22</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

- 4.30 Government has decided that DTT receiver filters should be the primary means for maintaining or restoring viewers' DTT reception. Platform changes could be used to restore TV reception for viewers where filters are technically ineffective. This does not preclude other mitigation options being used. For example, we note that the model for managing and funding MitCo decided on by Government places some incentive on new licensees to use mobile network-based mitigation techniques. We discuss this in more detail in Section 6.

## Costs of mitigation

- 4.31 Some respondents suggested that further cost modelling and analysis needed to be undertaken. It was also requested that we provide further detail on how the costs associated with providing consumer support were calculated.
- 4.32 Several respondents made specific comments on the costs we had estimated in relation to various mitigation techniques. For example, some thought that we had underestimated the cost of applying base station filtering. Other respondents thought that the cost of installing DTT receiver filters could be considerably higher than we had anticipated.
- 4.33 We note that we no longer propose to require new licensees to undertake network-based mitigation, e.g. base station filtering<sup>23</sup>. As set out in the previous section, Government has decided that new licensees will be responsible for providing consumer-based mitigation via MitCo and will also receive a proportion of any underspend of the money set aside for MitCo. This should provide some level of incentive for new licensees to use network-based mitigation where it is appropriate and cost-effective to do so in order to reduce the costs of consumer-based mitigation that they will bear via MitCo. We provide more detail on this in Section 6.
- 4.34 In addition, following a review of responses to the first consultation, we commissioned a more detailed analysis of the likely costs of managing and implementing consumer-based mitigation including information campaigns and provision and installation of DTT receiver filters. This work was carried out by Deloitte and their report on this subject (and other matters) is published on our website alongside this consultation document<sup>24</sup>. The costs of providing consumer support are also summarised at a high level in Section 6.

## Consumer support

- 4.35 Respondents who commented on this subject agreed that further work was necessary to understand likely impacts of coexistence proposals on consumers and to define an appropriate level of support.
- 4.36 The following is a summary of the main points made by respondents in relation to consumer support:
- Several respondents felt that it was difficult to gauge the appropriate level of consumer support until a fuller assessment of the consumer impact of LTE interference was carried out, e.g. by investigating how easy or difficult it would be for consumers to fit a DTT receiver filter;

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<sup>23</sup> Although, as noted in Section 6, licensees may choose to implement network-based mitigation.

<sup>24</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

- A number of respondents thought it would be very important to provide mitigation, e.g. receiver filters, to consumers in advance of interference occurring;
- Some respondents thought that the level of support provided should not distinguish between PSB and COM multiplexes, high and standard definition (HD and SD) services, primary and secondary sets or the quality of TV installation, etc;
- Some respondents thought that there would be an ongoing need for consumer support and that new licensees should have a commitment in their licences to provide this for the duration of the licence period;
- Some noted that they thought additional support should be provided to vulnerable groups;
- A number of respondents noted that lessons could be learnt from Digital UK's experience in providing consumer information and support during DSO;
- Concern was raised that the potential impacts on set-top aerials were not insignificant and further work would be required to test and model these impacts;
- One respondent thought that we had taken a different approach to the issue of interference with Cable TV services and interference to DTT.

4.37 Following the first consultation, we commissioned a piece of consumer research to investigate the ability of consumers to self-install a DTT receiver filter. This study, undertaken by Essential Research / SPA Future Thinking culminated in the production of a report which has been published alongside this consultation document<sup>25</sup>. The research was carried out during September and October 2011 and comprised 160 in-home interviews, including 10 interviews with vulnerable consumers (having a disability or long-term health condition). Consumers were interviewed about their expectations of fitting the filter and, after attempting the task, about their experience of doing so. We present some of the high level findings from the research below:

- *Expectations* - Having seen the filter, 94% of people said they were confident that they could install it correctly. Confidence was not significantly lower among respondents aged 65 and over, although 8% of these respondents thought they might need physical help (compared to 0% for the 45-64 age group).
- *During the task* - 97% of participants were able to fit the filter and over half did so within one minute. High success rates were common to all demographics. In total, six people gave up on fitting the filter and stated that in a real-life scenario they would most likely ask a friend or family member (rather than a professional) for help.
- *Feedback* - Across all demographics, 95% of respondents said the task was easy, including 80% who said it was very easy. 87% of people said they would need no other support to complete the task. Of the remainder, the majority cited a preference for telephone-based support. Overall, the majority of respondents viewed the task as positive and straightforward.

<sup>25</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

- *Vulnerable consumers* - Ten interviews were completed with vulnerable consumers. While this is not a statistically significant sample size, the research observed that these individuals did not find the filter any harder or easier to fit than the non-vulnerable respondents.
- 4.38 We note that the research took place in the absence of real interference. In addition, it did not address the situation where a consumer's installation makes use of a loft or mast-head amplifier. The research does however provide some useful insights on consumers' ability, and confidence in their ability, to self-install filters.
- 4.39 Government has taken decisions on the level of support that should be provided to DTT consumers. These decisions are set out in Section 3 and address the main issues raised by respondents as described above.

## MitCo

### MitCo options and the tariff mechanism

- 4.40 Respondents broadly agreed with our proposal that a single entity should be set up to manage coexistence issues. There was less agreement however on the proposed hybrid model for running MitCo. Most of the issues raised with the hybrid model related to the inclusion of a tariff mechanism element, whereby new licensees would be incentivised to undertake network-based mitigation through the application of tariffs. The majority of respondents who commented on this thought that a tariff mechanism would be complex and time consuming to establish and would in any case be unlikely to place correct incentives on licensees.
- 4.41 Government has decided that MitCo should be owned and operated by the 800 MHz licensees, overseen by a Supervisory Board. We consult further on the detailed implementation plan for MitCo and the Supervisory Board in Section 7.

### Duration of MitCo

- 4.42 Respondents held a variety of views on the length of time that MitCo should operate for. For example, the CAI and BT thought that a support system should continue beyond the main roll-out of 800 MHz networks while Arqiva and Sony suggested that there should be a commitment in 800 MHz licences for ongoing protection to DTT services from harmful interference. Vodafone thought that a suitable timescale for the closure of MitCo would be the timescale set for the coverage obligation attached to one of the 800 MHz licences. They suggested that network deployments after this point would be local and could be managed by each operator on a case by case basis.
- 4.43 Government has decided that MitCo should exist for one year after network roll out, with a backstop closure date of 2017. We provide more detail on possible arrangements relating to the closure of MitCo in Section 7.

### MitCo funding

- 4.44 Mobile operators and some other respondents thought that mitigation measures should be funded from the auction revenues. They suggested that the cost of implementing mitigation measures is uncertain and placing this uncertainty on new licensees could impact the efficiency of the 800 MHz auction.

- 4.45 Government has decided that new licensees should between them provide £180m for the funding of MitCo. Any overspend would be borne by Government. We provide more detail on how we expect this to work in practice in Section 7.

## Licence conditions

### Technical licence conditions

- 4.46 In our June 2011 consultation, we provisionally proposed to set tighter out of block emission limits in certain geographic areas, while not specifying which geographic areas. We also suggested it might be appropriate to set tighter in block emission levels in some geographic areas, but did not make specific proposals on this point.
- 4.47 On the out of block emission level proposals, several respondents, including some from the telecoms sector, agreed that we should require the use of base station filtering. Two telecoms stakeholders however thought that we had underestimated the cost of applying base station filtering, for example because of limited space at mobile base stations to fit additional filters and because of the expense involved in per block testing requirements. Vodafone suggested that, even based on the costs set out in our consultation, the cost per household<sup>26</sup> of applying base station filtering would be high and that requiring new licensees to use base station filtering would be disproportionate.
- 4.48 On the in block emission level suggestion, we again received a mixed response. Some were in favour, with, for example, Arqiva noting that, in Sweden, the regulator had applied power restrictions to the lowest 800 MHz spectrum block, and supporting this approach. Samsung thought that an in block power level of 56dBm/5MHz would be appropriate. Everything Everywhere also noted the Sweden approach but pointed out that this had resulted in a substantially lower auction price for this lot, demonstrating the cost of this approach as a mitigation measure.
- 4.49 Government has decided that MitCo will be led and funded by new 800 MHz licensees and that these licensees will benefit from any MitCo underspend via a gainshare arrangement. This should provide some incentive for new licensees to implement mobile network-based mitigation where it is cost effective to do so. In view of this and following review of consultation responses, we are now minded not to set tighter out of block and in block emission levels in certain areas; rather, these levels would, on a UK-wide basis, be as set out in our consultation on technical licence conditions, published on 2 June 2011<sup>27</sup>.

### Conditions governing coordination

- 4.50 In the first consultation, we proposed a number of licence conditions in this area as follows:
- a licence condition requiring licensees to provide MitCo with full details as to their existing network as well as plans for any future deployment;
  - a licence condition requiring new licensees to coordinate with MitCo;

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<sup>26</sup> Per household predicted to benefit from additional base station filtering

<sup>27</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/tlc/summary/condoc1.pdf>

- a licence condition that requires licensees to comply with the tariff system;
  - a possible licence condition allowing MitCo to access new licensees base stations to install an on-channel repeater (OCR);
  - a licence condition to require new licensees to seek Ofcom approval before turning on base stations in certain specified areas where effective mitigation may be difficult.
- 4.51 Most respondents who commented agreed that certain information, such as deployment plans, would need to be provided to MitCo. Arqiva suggested that this information should also be provided to the Joint Planning Project (JPP) to enable accurate frequency planning of existing and future DTT services.
- 4.52 Other respondents advised caution with regard to information-related licence conditions. For example, Everything Everywhere thought it would be important that the information be carefully managed. They pointed out that network rollout information is commercially confidential information and it is important that the sharing of information does not become a method for 800 MHz licensees to gain access to each other's plans. They also noted that any information MitCo requires from the new licensees would need to be clearly specified and that the proposal of a generic information-related obligation would not be appropriate.
- 4.53 On information requirements, we note that, to enable MitCo and the Supervisory Board to operate effectively, new 800 MHz licensees will need to provide quite detailed information regarding their networks to MitCo (and possibly also to the Supervisory Board and Ofcom).
- 4.54 We recognise that some of the information that new licensees will need to provide may be highly commercially sensitive. We further recognise that, in circumstances where such information needs to be shared between licensees, there is a potential risk that doing so might infringe the requirements of competition law. This is a risk that, in Ofcom's view, new licensees will need to manage, for example by taking steps to ensure appropriate Chinese wall arrangements are in place.
- 4.55 We have set out in Section 8 of this consultation the kinds of requirements that we consider may be necessary in this regard.
- 4.56 As noted previously, Government has now decided that MitCo should be led by the new 800 MHz licensees, and a tariff mechanism is not required. This means that we no longer propose to apply the tariff mechanism licence condition mentioned above. For OCRs, as we set out in Section 6, we do not expect that OCRs will be widely used and no longer propose an OCR-related licence condition. If however new licensees express interest in using OCRs, we will revisit the OCR licensing and implementation issue.
- 4.57 Government has also decided that MitCo will need to help households who lose DTT and who cannot receive an alternative platform, up to a maximum of £10k per household. We therefore no longer consider that a licence condition requiring Ofcom approval to turn on base stations in certain areas is likely to be necessary.

## Other issues

### 4G approval scheme

- 4.58 Telefonica recommended that a 4G approval scheme be put in place to certify that TV equipment had undergone testing against susceptibility to interference from new 4G services. Arqiva noted that some companies are developing receiver antennas with built in filters and that this shows that the consumer industry is already preparing for the challenge of 4G interference.
- 4.59 While Ofcom do not propose to introduce a 4G ready approval scheme, we think that TV receiver manufacturers will naturally wish to ensure that future receiver designs are as resilient as possible against potential 4G interference in order to retain consumer confidence in their products.

### Pre-switch on testing

- 4.60 Telefonica UK and one individual respondent thought that new 800 MHz licensees could undertake testing to identify DTT interference in advance of the commercial launch of mobile services.
- 4.61 Government has decided that the support provided to consumers by MitCo should include the proactive supply of DTT receiver filters. Our view is that this approach will help to achieve the same objective as pre-switch on testing, namely to minimise disruption to DTT viewers and the time for which they are without a DTT service. In addition, while we do not propose to require new licensees to undertake pre-switch on testing (except where MitCo fails to meet certain KPIs, see Section 7 for further details), they could decide to do this if they believe that this is the best way to meet their licence obligations in relation to proactive provision of filters.

### Impact on PMSE

- 4.62 The impact on the PMSE industry of interference from new 800 MHz services was raised by the British Entertainment Industry Radio Group (BEIRG) in response to our June 2011 consultation. BEIRG expressed concern that interference into channels 60 and below would reduce the amount of geographic interleaved spectrum available for PMSE use, while PMSE spectrum users above 862 MHz could also be negatively impacted.
- 4.63 We acknowledge that there may be instances where PMSE users of interleaved spectrum in channels close to the 800 MHz band (e.g. channels 60 or 59) may experience interference if they are also located close to a base station. However, we do not believe that this will have a material impact on the availability of spectrum for PMSE use.
- 4.64 Ofcom is consulting separately on whether technical conditions need to be applied to licences for 800 MHz (and 2.6 GHz) spectrum to protect adjacent services. We have not yet concluded that consultation exercise, but our current position with respect to Short Range Devices (including audio devices in the licence exempt band 863-865 MHz) is as set out in the Update “Use of Short Range Devices alongside mobile broadband services operating in the 800 MHz band” published in November 2011<sup>28</sup>.

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<sup>28</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/tlc/annexes/Update.pdf>

## Section 5

# Impact of interference

## Introduction

- 5.1 In Section 4 of our first consultation<sup>29</sup> published on 2 June 2011 we introduced the potential issue of interference from new services in the 800 MHz band to DTT services below 790 MHz. We explained our approach to modelling the impact of interference and published a set of results<sup>30</sup> which predicted that up to 760,000 DTT households could be affected<sup>31</sup>.
- 5.2 As noted in Section 4 of this document, we received several responses to the June 2011 consultation which raised concerns over the modelling approach and certain key parameter values used in the modelling. Some respondents were concerned that certain parameter values used could result in an under-estimate of the total number of households affected by interference, and therefore a sensitivity analysis would be required in order to understand the impact of varying certain parameter values.
- 5.3 Taking respondents' comments into account, and in light of new evidence and measurement data on filters and amplifiers, we have revised our analysis. In this section we present results for a 'central' scenario. The full details of this analysis and an associated study of sensitivities to various parameter values (including 'high' and 'low' scenarios) are presented in a separate technical report.<sup>32</sup>
- 5.4 The adopted changes to the modelling approach and the parameter values result in an increase in the estimated total number of potentially affected households from 760,000 to 2.29 million in the absence of any mitigation measures. Installing DTT receiver filters reduces this figure to 38,500. If, in addition to this, mobile network-based mitigation (in the form of reduced radiated power and transmitter filtering) was applied at the 150 base station sites<sup>33</sup> which are predicted to cause the greatest interference impact, the estimated total number of remaining households affected by interference is 17,000. The results presented in this section represent our final view on the effect of the interference, and have been used to help inform Government decisions on the funding of MitCo, as set out in Section 7. We believe that these results represent a conservative view of the impact of interference and the actual impact is expected to be lower in practice. It should be noted that the actual impact of interference will depend on the specifics of mobile network roll-out and the quality of consumers' DTT installations.

## Changes to methodology

- 5.5 In the original analysis we modelled the impact on the coverage area of a selected number of DTT transmitters. The impact to these transmitter regions was extrapolated to obtain an estimate across the UK. The revised analysis models all DTT transmitters and therefore no extrapolation is necessary.

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<sup>29</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/summary/dttcondoc.pdf>

<sup>30</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/dtt/annexes/Technical-Report.pdf>

<sup>31</sup> 'Affected' in this context means that the reliability of the DTT service that a consumer receives drops below the planned level of "availability for 99% of the time". This drop in reliability can manifest itself as a degradation of picture and/or audio, or complete loss of one or more DTT channels

<sup>32</sup> <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/>

<sup>33</sup> 150 sites with 3 co-located base stations at each site

## Changes to key parameter values

- 5.6 Some respondents to the June 2011 consultation pointed out that certain parameters can take on a range of values that are different from the values used in our technical modelling – in particular the radiated power per base station and the total number of base stations.
- 5.7 Some respondents questioned the basis of our assumptions on how DTT receiver equipment might perform in the presence of LTE interference - in particular amplifiers used to boost DTT signals in homes and communal aerial systems.
- 5.8 Based on the evidence provided by respondents and in light of new data we have updated these parameter values in our revised modelling. The primary updates are set out below. It should be noted that base station radiated power and the number of base stations are the dominant factors which result in the increase in affected households from 760,000 to 2.29 million.

### Transmit power

- 5.9 In our previous modelling we assumed base stations would radiate at a power of 59 dBm/(10 MHz), consistent with what we considered existing equipment could achieve. This was lower than the maximum permitted radiated power of 64 dBm/(10 MHz), specified by the proposed licence conditions for the 800 MHz band in the UK.
- 5.10 Several stakeholders argued that it would not be unrealistic for a network to use the maximum permitted power in practice, and that it is necessary for the modelling to be consistent with the licence conditions, as there is nothing to prevent an operator from running their entire network at this maximum permitted power in practice.
- 5.11 While we do not believe every base station in a national network would operate at the maximum licensed power, we accept the need for a cautious approach as the modelling results are used to inform the cost estimates for consumer mitigation. Additionally, we now have access to further information on the capabilities of base station equipment. This supports the possibility of radiation at the maximum permitted power and so our revised modelling assumes a radiated power of 64 dBm/(10 MHz) at every base station.

### Number of base stations

- 5.12 We previously assumed that a UK wide deployment in the 800 MHz band would consist of around 9,000 base stations per operator<sup>34</sup>. This was based on the typical size of existing deployments in the 900 MHz band. It was assumed that an operator would use this number of base stations as a coverage layer at 800 MHz, taking advantage of the improved coverage at lower frequencies while using higher frequencies to provide additional capacity in areas of high demand.
- 5.13 Respondents to the consultation argued that there would be nothing to stop an operator from deploying a higher number of base stations in practice, and therefore this should be considered in the modelling. Additionally, as there are existing networks with more than 9,000 sites in other bands, it would be relatively easy for an

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<sup>34</sup> Specifically, we modelled three LTE networks, one in each of blocks A, B, and C, with full site-sharing among the three networks, with each network comprising around 9,000 sites (or  $3 \times 9,000$  base stations in total).

operator to upgrade existing sites at 800 MHz (when compared with the alternative of building new sites).

- 5.14 Following our review of responses and further discussions with interested stakeholders, we have revised our central scenario. The revised central scenario is modelled on the basis of 3 co-located networks at approximately 11,000 sites<sup>35</sup>.

### **DTT receiver filters**

- 5.15 In our previous analysis we modelled the effectiveness of receiver filters as a consumer based mitigation option. The filter characteristics used were based on a limited set of available devices.
- 5.16 Since the publication of the June 2011 consultation we have investigated the performance of alternative filter technologies. This work has included Ofcom commissioning the manufacture of a small number of new filter prototypes and measuring their performance. We are now confident that filters can be manufactured that will offer better mitigation against interference for a similar cost to the filters assumed previously.
- 5.17 We have incorporated these improved filter characteristics into the revised analysis. While the total number of households estimated to be affected by interference in the absence of mitigation has increased, the improved filter performance means that the number affected after a receiver filter has been installed has reduced from 84,000 to 38,500 as compared to our previous analysis.

### **Additional testing of DTT amplifiers**

- 5.18 Our previous modelling included an estimation of the interference impact on DTT households which use an amplifier to boost the received DTT signal (and which are typically more susceptible to interference than standard installations). This included two categories of installation: communal antenna systems and domestic installations with amplifiers<sup>36</sup>. The assumptions used in the modelling of the susceptibility of these systems were based on a limited range of testing of one of each type of amplifier.
- 5.19 Since the publication of the previous consultation we have engaged in a further program of measurements and have tested an additional 3 devices of each type of amplifier.
- 5.20 The devices used in testing were chosen in order to capture the wide range of amplifier performance and cost that exists in the market across the UK. The test results show a similarly wide range in susceptibility to interference.
- 5.21 In order to incorporate this full range of susceptibility to interference in our modelling we have adopted a statistical method for determining the specific performance of an amplifier at each household which aims to capture the wide range of performance known to exist in the market. This approach is explained in detail in the technical report.

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<sup>35</sup> We assume co-location across the 3 blocks A, B, and C as we do not have access to base station location data for 3 separate deployments. Additionally we expect some degree of site sharing to exist in 800 MHz networks.

<sup>36</sup> Communal antenna systems use an amplifier to distribute a TV signal to multiple dwellings, e.g. in an apartment block. Domestic installations with amplifiers are where an amplifier is used in a single dwelling to improve coverage or for distribution to multiple TV sets.

- 5.22 Several respondents to the consultation also questioned our assumption on the total number of domestic amplifiers<sup>37</sup>, which would have an effect on the total number of households affected by interference. We therefore include a total of 9 million domestic amplifiers in the revised modelling (5.65 million was used previously)<sup>38</sup>.

### DTT receiver performance

- 5.23 In our previous modelling we adopted a pessimistic assumption on the performance of DTT receivers for 'standard' installations (i.e. households without amplifiers), where each standard household was assumed to have a poor performing receiver in the presence of interference.
- 5.24 In the revised analysis we have adopted a similar statistical approach to that outlined above for amplifiers. This incorporates the performance of individual DTT receivers (i.e. set top boxes and TV sets with integrated DTT receivers) from testing with its impact in the UK market using data from the Digital TV Group<sup>39</sup>.
- 5.25 We believe that our revised approach provides a better reflection of the situation in reality and therefore provides a more accurate estimate of the total number of households affected by interference.

### Central scenario modelling results

- 5.26 The central scenario refers to the parameter values described earlier in this section. This involves a UK-wide mobile communication network deployed in each of the 10 MHz blocks A, B, and C<sup>40</sup>. Each network consists of around 11,000 base stations, with each base station radiating at the maximum permitted power of 64 dBm/(10 MHz).
- 5.27 Five cases of mitigation are considered in the modelling, as follows:
- Case (a) – No mitigation – all base stations in the network transmit at maximum power, and no filtering is used;
  - Case (b) – Consumer-based mitigation only (DTT receiver filtering), applied to all households;
  - Case (c) – Mobile network-based mitigation only (base station transmitter filtering and reduced radiated power), applied to all base stations;
  - Case (d) – Both consumer-based and mobile network-based mitigation (as in cases (b) and (c));

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<sup>37</sup> Specifically, we assumed that only 1/3 of 'indoor' amplifiers would be in use on primary DTT sets. We now consider all 5 million 'indoor' amplifiers to be used in conjunction with primary sets.

<sup>38</sup> It should be noted that this results in an equivalent decrease in the total number of standard installations from 16.3 million to 13 million.

<sup>39</sup> DTG Testing, 3 May 2011, 'LTE Interference'

<sup>40</sup> For the purposes of the modelling that we have undertaken in relation to DTT coexistence, we have assumed there will be three mobile networks, each using three 2x10 MHz blocks. For convenience, we refer to these three blocks as "A" (791-801 MHz paired with 832-842 MHz), "B" (801-811 MHz paired with 842-852 MHz), and "C" (811-821 MHz paired with 852-862 MHz). In practice, the 800 MHz band will be auctioned in six blocks of 2x5 MHz and this may result in different spectrum holdings to those assumed here. We expect that a different configuration of spectrum holdings in the 800 MHz band is likely to result in a broadly comparable impact in terms of the numbers of households affected.

- Case (e) – Both consumer-based and mobile network-based mitigation (as in case (d)) but with mobile network-based mitigation only applied at the 150 base station sites which cause the greatest interference impact<sup>41</sup>.

5.28 Results for these cases are presented below.

**Table 5.1: Estimated numbers of households affected for different mitigation combinations**

	Standard domestic installations	Communal aerial systems	Domestic installations with amplifiers	Total
Number of households served				
	13,000,000	5,600,000	9,000,000	27,600,000
Number of households affected by interference				
(a) - No mitigation	390,000	953,000	945,000	2,288,000
(b) - Consumer based mitigation	17,700	10,000	10,800	38,500
(c) - Mobile network based mitigation	206,000	648,000	560,000	1,414,000
(d) – Consumer based and mobile network based mitigation	1,600	300	1,400	3,300
(e) – Consumer based mitigation and selective mobile network based mitigation	8,500	3,400	5,100	17,000

5.29 The estimated total number of households affected by interference in the absence of any mitigation measures (Case (a)) is approximately 2.29 million. This figure is largely dominated by interference to non-standard installations (communal aerial systems and domestic installations with amplifiers).

5.30 As was shown in the previous modelling undertaken for the June 2011 consultation, DTT receiver filters are the most effective method of mitigation. The new class of filters as outlined above in Table are shown to be more effective than those assumed previously. The residual number of affected households is estimated to be 38,500 if DTT receiver filters are installed at every affected household (Case (b)).

5.31 Applying network based mitigation at all base stations without any receiver filters would result in 1.41 million remaining affected households (Case (c)). This form of mitigation is most effective when combined with receiver filtering, which reduces the estimated residual number of households to 3,300 if network-based mitigation is applied to all base stations (Case (d)), or 17,000 if selective network-based mitigation is used at the base station sites which cause the greatest interference impact (Case (e)).

<sup>41</sup>. The process for selecting the 150 base station sites is explained in the context of cost calculations in Section 6.

- 5.32 The above results include interference contributions from all 3 networks (i.e. Blocks A, B and C). In order to understand the contribution of each network, we have modelled the total number of households affected if each network were transmitting in isolation. Results for this scenario are shown below:

**Table 5.2: Number of affected households by MFCN block and mitigation case<sup>42</sup>**

Mitigation Case	Block A	Block B	Block C
A - No mitigation	1,063,000	988,000	980,000
B - Consumer based mitigation	18,900	13,900	14,000
C - Mobile network based mitigation	625,000	574,000	565,000
D –Consumer based and mobile network based mitigation	3,100	<100	<100

- 5.33 The above results show that in the absence of mitigation the interference contribution from each block is broadly similar, with slightly higher contributions from Block A. This is as expected as the bulk of interference is caused as a result of amplifiers being overloaded; an effect that is generally independent of the frequency block being used. A minority of interference is caused by out of band emissions from the mobile base stations; an effect that is worse the closer in frequency you are to the interfering block. Filtering is shown to have a greater impact in Blocks B and C, as the increased separation in frequency from the DTT channels means filters can be more effective in mitigating interference for Blocks B and C than for A.

## Impacts on DTT coverage

- 5.34 The following table shows the impact of interference on DTT coverage figures. It should be noted that these figures cannot be directly compared with the impact figures presented in Table 5.1, as they are calculated using slightly different methods in order to be consistent with the assumptions used in DTT network planning<sup>43</sup>.

<sup>42</sup> Case E is not applicable here as the cost calculation relies on the combined effect of all 3 blocks.

<sup>43</sup> DTT coverage planning does not take different installation categories into account as in Table 5.1. Additionally the method for calculating the number of served households at a local level is different. For further detail please see Section 4 of the technical report.

**Table 5.3: Impact on PSB and COM coverage**

	<i>Based on current PSB and COM coverage of 98.47% and 90.57% respectively</i>					
	No. of HHs losing $\geq$ 1 PSB mux	No. of HHs losing $\geq$ 1 COM mux	Reduction in PSB coverage as % of total population	PSB coverage figure after reduction	Reduction in COM coverage as % of total population	COM coverage figure after reduction
(a) - No mitigation	1,099,200	1,053,400	3.99%	94.48%	3.82%	1,099,200
(b) - Consumer based mitigation	29,900	31,900	0.11%	98.36%	0.12%	29,900
(c) - Mobile network based mitigation	540,700	534,900	1.96%	96.51%	1.94%	540,700
(d) – Consumer based and mobile network based mitigation	2,300	3,400	0.01%	98.46%	0.01%	2,300
(e) – Consumer based mitigation and selective mobile network based mitigation	13,100	12,300	0.05%	98.42%	0.04%	13,100

- 5.35 In the absence of any mitigation measures (Case (a)) we estimate that PSB coverage would decrease by 3.99% of total UK population, and COM coverage by 3.82% of total population.
- 5.36 With the inclusion of receiver based mitigation (Case (b)) this reduces to an estimated 0.11% for PSB and 0.12% for COM. With the further addition of network based mitigation (cases (d) and (e)) the reduction in coverage for both PSB and COM is estimated to be 0.01 – 0.05% of the total population.

## Sensitivity analysis

- 5.37 As noted above and in Section 4, several respondents to the June 2011 consultation highlighted the need for a sensitivity analysis in order to understand how the estimated number of households affected by interference might change as a function of variations in key parameter values.
- 5.38 In light of these comments we have undertaken a sensitivity analysis which complements the revised analysis outlined above. This sensitivity analysis investigates the effects of varying the following parameters:
- Mobile base station radiated power
  - Number of base stations in the mobile network (low and high deployment scenarios)
  - Use of site sharing among mobile base stations
  - DTT coverage assumptions (preferred service area)

5.39 The full sensitivity analysis and results are presented in the technical report.

## Interference from mobile handsets

5.40 The modelling described in this section addresses the issue of interference from mobile base stations in the 800 MHz band to DTT reception. It is also possible that mobile handsets could cause interference to DTT, for both roof-top and set top aerial reception. It would be difficult to model the impact of this on a national basis.

5.41 Mobile handsets in the 800 MHz band may also cause interference to DTT if they are operated in close proximity to the DTT receiving equipment or aerials. The interference from the mobile handset can enter the receiving DTT equipment directly (through cabling or the casing of the receiver), through a fixed outdoor roof-top aerial, or an indoor portable set-top aerial. It should be noted that certain models of DTT receiving equipment are more susceptible to interference than others.

5.42 In contrast to interference from base stations to rooftop reception, where the fixed nature of the aerials means that extra equipment (e.g. filters) will be needed to resolve the interference, interference arising as a result of mobile handsets should in most cases be relatively easily dealt with by moving the mobile handset away from the affected equipment.

### Interference from mobile handsets to DTT equipment

5.43 We carried out a technical study looking at this issue in late 2009<sup>44</sup>. The study concluded that there was a low probability of harmful interference from handsets directly into DTT equipment. Even the worst performing DTT receiver tested did not suffer from picture degradation until the mobile handset, radiating at maximum power, was placed within 1.4 metres of the receiving equipment<sup>45</sup>. In such scenarios, interference could be readily remedied by moving the handset away from the DTT receiving equipment.

5.44 The technical study referred to above also examined the case of interference entering through a DTT indoor set-top aerial. The study found that 1 out of 5 tested DTT receivers suffered interference when a set-top aerial was used and the mobile handset, transmitting at near full-power, was placed within 2.5 metres of the aerial<sup>46</sup>. Other receiving equipment did not suffer interference until the mobile handset was placed much closer. Once again, in such scenarios, interference could be readily remedied by moving the handset away from the set-top aerial.

5.45 The technical study referred to above also examined the case of interference entering through a DTT roof-top aerial. The study found that the probability of mobile handset interference to roof-top aerials is very low.

5.46 We recently commissioned a further study to summarise existing work on the issue of interference from mobile handsets to set-top and roof-top DTT aerials<sup>47</sup>. The study re-confirms that for the majority of DTT receivers interference is only a problem if there is a separation distance of less than 3 metres between the handset and the DTT aerial, and if the DTT signal strength is low.

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<sup>44</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/800mhz/statement/2010-0026.pdf>

<sup>45</sup> The test involved a low DTT signal level to emulate an area of poor DTT coverage.

<sup>46</sup> The test involved a low DTT signal level to emulate an area of poor DTT coverage.

<sup>47</sup> Real Wireless, February 2012. 'Dynamics of 3GPP LTE uplink: 800 MHz DTT and LTE Coexistence'. To be published in due course.

- 5.47 It should also be noted that the DTT receiver filters described in this section for purposes of mitigating interference from base stations will also be effective in mitigation interference from mobile handsets.

## Section 6

# Mitigating interference to DTT services in the context of Government decisions

## Introduction

- 6.1 In our June 2011 consultation, we presented our initial assessment and conclusions on the mitigation techniques that would form a core part of the measures adopted to mitigate interference.
- 6.2 We suggested that DTT receiver filters and base station transmit filtering would play a key role, and that platform changes could be used to deal with remaining problems. We also noted that it would be difficult for us to prescribe in advance where network-based mitigation techniques should be used. Rather, we thought it would be more appropriate to use some form of incentive mechanism to encourage new licensees to undertake network based mitigation where it is efficient to do so.
- 6.3 As set out in Section 3, Government has now decided on the level of support that should be offered to DTT consumers. This support is predicated on the widespread provision of DTT receiver filters. Platform changes will be offered to eligible consumers where filters are ineffective.
- 6.4 Government has also decided that MitCo should be led and funded by new 800 MHz licensees. New licensees will be eligible to receive a proportion of any underspend that MitCo achieves. They will be able to influence the size of this potential underspend directly by the amount of network-based mitigation that they employ. Increased network-based mitigation will reduce the need for, and costs of, consumer-based mitigation provided via MitCo.
- 6.5 In this section we:
- present our updated view on which mitigation techniques are likely to be used to manage the coexistence issue;
  - provide updated information on the likely costs of implementing the Government's decision on the level of support that will be offered to consumers;
  - describe the possible extent of network-based mitigation and the impact this could have on the number of platform changes offered and on DTT coverage.

## Updated view on mitigation techniques

- 6.6 We assessed a range of mitigation techniques in the June 2011 consultation. We have reconsidered these in light of stakeholder responses and our further technical analysis. Our revised views are presented in Table 6.1 below.
- 6.7 The main change from the proposals set out in our June 2011 consultation is that we no longer propose to set stricter out-of-block emission levels that would effectively require new licensees to use better base station transmit filtering. Rather, new licensees may choose to use this approach to reduce the costs they will bear in relation to consumer-based mitigation where it is cost-effective to do so.

**Table 6.1: Updated view on mitigation techniques**

<b>Mitigation techniques</b>	<b>Likely extent of use of mitigation technique</b>	<b>Comments</b>
<b>DTT receiver filters</b>	Extensive	DTT receiver filters continue to be the most technically effective and cost effective mitigation technique that we have identified. Government's decision on the level of consumer support is predicated on the provision of these filters to consumers.
<b>Improvements to DTT receiver equipment</b>	Optional, limited	Some DTT receivers are significantly more susceptible to interference than others. In some cases, the presence of a particularly poor DTT receiver may mean that a filter alone is ineffective. It may be possible to reduce the number of platform changes needed by providing a <i>less</i> susceptible DTT receiver along with a filter. It would be for MitCo, possibly under the direction of the Supervisory Board, to decide on when and how to apply this technique.
<b>Re-pointing DTT receive aerials</b>	Optional, limited	There was limited stakeholder appetite for this technique due to concerns over receiving the correct regional variations of PSB TV services. One stakeholder also noted that this would likely cost more than the estimate provided in our June 2011 consultation.
<b>Platform changes</b>	Optional, limited	Platform changes remain an effective way of restoring TV reception when DTT filters have been installed and fail to remedy interference.
<b>Use of improved base station filters</b>	Optional, targeted to particular base stations	While some stakeholders supported mandating this mitigation technique, others pointed out that it would likely cost more than we had estimated and that it would be disproportionate to require the use of base station filtering in all 800 MHz spectrum blocks. We no longer propose to mandate this approach; rather, we expect that new licensees will choose to use this method where it is cost-effective to do so.
<b>Base station power reductions</b>	Optional, targeted to particular base stations	We remain of the view that nationwide use of power reductions is unlikely to be efficient. However, targeted reductions may significantly reduce the effects of interference and the costs of consumer-based mitigation incurred via MitCo.
<b>On Channel Repeaters(OCRs)</b>	Optional, very limited	Some respondents thought OCRs deserved further consideration but several pointed out the technical and licensing challenges. We currently expect that the use of OCRs will be very limited, although we would give them further consideration, e.g. in relation to how they might be licensed, if new licensees showed a keen interest in using them.

<b>Cross polarisation</b>	Optional, very limited	The use of cross polarisation was generally not supported by providers of existing DTT services and potential new licensees. Both its costs and efficacy were questioned, and we expect that it will play little role in mitigating interference, although new licensees will be free to do so if they wish.
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## Estimated costs of delivering Government’s chosen level of consumer support

6.8 In Table 6.2, we summarise the costs of the Government’s chosen level of consumer support, based on the decisions we have outlined in Section 3. We present both a central case estimate, which reflects our best estimate of costs, plus a range that reflects the uncertainty surrounding the extent of network rollout.

**Table 6.2: Estimated costs of consumer support elements<sup>48</sup>**

Consumer support element	Central case estimate <sup>49</sup>	Cost range <sup>50</sup>
Information and advice for all households	£23m	£23m
Proactive filters for households most likely to experience interference	£69m	£56m to £78m
Reactive filters for primary DTT households only	£9m	£9m to £10m
Installation support for vulnerable consumers	£21m	£18m to £28m
Platform changes for primary DTT households where filters are ineffective	£9m	£8m to £11m
<b>Total cost</b>	<b>£131m</b>	<b>£114m to £150m</b>

*Source: Deloitte analysis of Ofcom data*

6.9 Since the publication of the Deloitte report, we have made a refinement to the software used to process the technical modelling results which gave rise to inaccuracies. In the original method the number of households predicted to be affected by interference was underestimated by approximately 4%. This resulted in

<sup>48</sup> The costs are not adjusted for inflation and are in 2012 prices. The effects of RPI inflation could increase these costs by around 10%.

<sup>49</sup> This reflects the “central volume” scenario discussed in the Deloitte report in section 3.3.2 and the “most likely” estimate of unit costs as discussed in [section 5.3.2], updated to reflect the number of households affected as discussed in Section 5 of this document

<sup>50</sup> This reflects the uncertainty over the extent of network rollout (i.e. uncertainty over the number of cases of DTT interference that Mitco will need to address), not uncertainty surrounding unit costs. To derive the three cases we have used scenarios outlined in Section 8 of the technical report. For the low case we have used scenario 1.2, for the central case scenario 2.2 and for the high case scenario 2.3

an equivalent underestimate of the total cost of mitigation. The results presented in this document have been updated to correct for this discrepancy. For this reason the numbers here differ from those presented in the Deloitte report.

## Impact and likely extent of mobile network-based mitigation

6.10 As discussed in Section 5, the use of mobile network-based mitigation reduces the effect of interference on DTT viewers, meaning that there is less need for consumer-based mitigation such as installing filters has to be done. In this sub-section we discuss the potential benefits of network-based mitigation and the degree to which it might occur, along with the impact that it may have on the number of platform changes and on DTT coverage.

### Mandatory power reductions have not been specified

6.11 The Government has recommended that Mitco be run by the new 800 MHz licensees. It has not recommended that any particular technical limits be placed on the new licensees, beyond those recommended in the consultation on technical licence conditions for the 800 MHz and 2.6 GHz bands.<sup>51</sup>

6.12 In principle, we could impose ex ante requirements (i.e. licence conditions) on mobile operators to modify their base stations in a way that would mitigate interference. However, it would be very difficult if not impossible to tailor those obligations to ensure that they were targeted at those base stations most likely to cause the greatest interference, and we would also be poorly placed to identify the costs of such obligations, particularly as these would tend to vary between base stations. The outcome would almost certainly be sub-optimal, delivering an inefficient level of network based mitigation at a higher cost than necessary. As we go on to show, the effectiveness of network mitigation varies substantially between base stations. Therefore effective network mitigation is likely to be targeted at particular base stations.

### The benefits of network-based mitigation vary by base station

6.13 To assess the likely level of network-based mitigation that could occur under the Government's decisions on Mitco, we have carried out some simple analysis looking at the savings in the costs of consumer-based mitigation that can be made when network-based mitigation is used.

6.14 As discussed in Section 3, new licensees will receive 50% of Mitco's underspend. Therefore, where Mitco saves money from a reduced amount of consumer support activity, the new licensees benefit from 50% of this reduction. We consider it likely that the new licensees in the 800 MHz band will take this into account when considering whether to undertake network mitigation.

6.15 The following formula describes the potential benefit to new licensees with and without network mitigation.

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<sup>51</sup> <http://stakeholders.ofcom.org.uk/binaries/consultations/tlc/summary/condoc1.pdf>

**Figure 6.1: Formula for calculating the benefit of network-based mitigation**

Consumer cost to Mitco with no network mitigation	= $X_1$
Consumer cost to Mitco with network mitigation	= $X_2$
Cost of network mitigation	= $Z$
Consumer mitigation saving accruing to new licensees	= $Y$ = $50\% * (X_1 - X_2)$
Therefore:	
Gainshare with no mitigation	= $[180] - 50\% * X_1$
Gainshare with network mitigation	= $[180] - 50\% * X_2$
Benefit to new licensees	= $50\% * (X_1 - X_2) - Z$ = $Y - Z$

- 6.16 Y represents cost savings from consumer-based mitigation that new licensees benefit from, and Z is the cost of network-based mitigation. If at a given base station, Y – Z is small (or if Z is bigger than Y), the value of network-based mitigation will be small (or negative). By contrast if Y – Z is large, new licensees are more likely to undertake network-based mitigation.
- 6.17 By combining the results of technical modelling, along with assumptions regarding the level of consumer support, we can estimate the value of Y for each base station. Where a base station causes a high level of interference, the cost  $X_1$  (the cost of consumer support before any network-based mitigation) is likely to be high, and the value of Y – Z is also likely to be greater relative to other base stations.
- 6.18 However, as noted we cannot reliably estimate Z for a particular base station. The costs of network-based mitigation on mobile operators (and by extension mobile consumers) would be difficult to quantify as network-based mitigation does not necessarily impose any direct costs on mobile operators, but may affect the quality of their mobile networks which may have indirect costs on the operators. For the purposes of illustrating the potential benefits of network-based mitigation we look at the two cases outlined in Table 6.4 below

**Table 6.4: In block and out of block powers with and without network-based mitigation**

	In block power (dBm) <sup>52</sup>	Out of block power (dBm)
<b>No network-based mitigation</b>	64	0 <sup>53</sup>
<b>With network-based mitigation</b>	61	-15

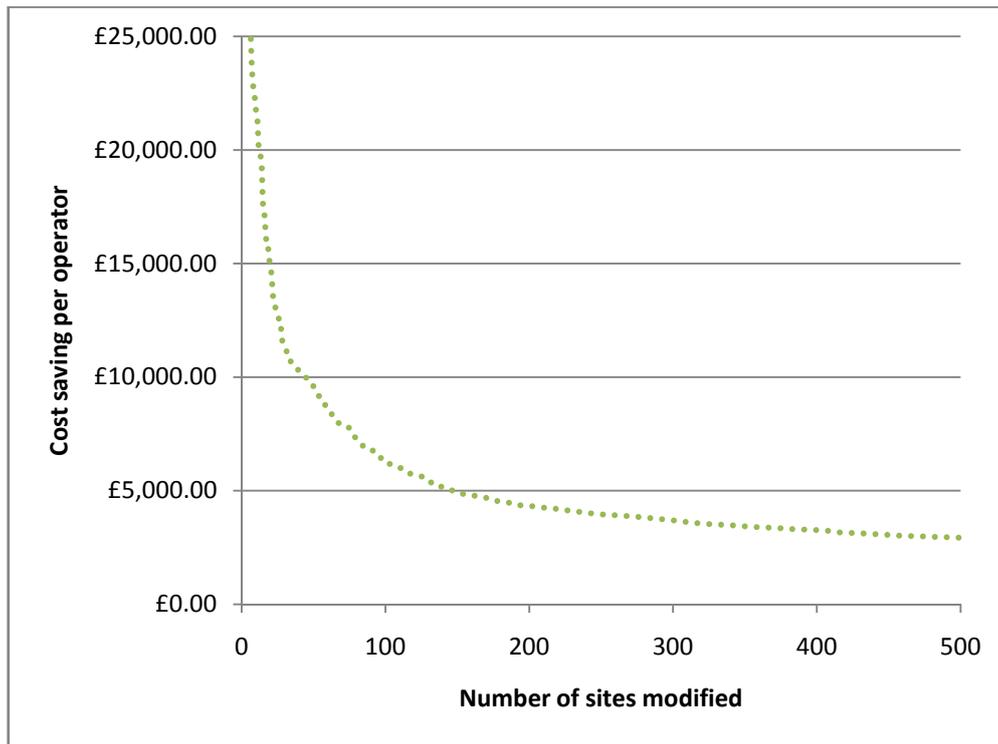
6.19 Figure 6.2 below shows the consumer-based mitigation costs that could potentially be saved for each network operator if network-based mitigation was used at each base station taking the gainshare into account. In other words it shows the reduction, Y (the consumer mitigation savings accruing to the new licensees) at each base station when network-based mitigation is used. The base stations are ranked in order of cost saved. The cost savings assume all the operators undertake the network-based mitigation at each site, but the cost savings are shown per operator<sup>54</sup>. The chart shows the incremental saving per operator of applying network-based mitigation to the site, e.g. the incremental saving to each operator of applying network-based mitigation to the 100<sup>th</sup> most cost effective base station is around £6k whereas the 500<sup>th</sup> most cost effective base station generates savings of around £3k.

<sup>52</sup> Per base station, not per antenna

<sup>53</sup> The Commission Decision 2010/267/EU specifies a nominal 0dBm/8MHz for all DTT channels 21-60. However, in practice, the out of block power will decrease the further the distance in frequency from 790 MHz.

<sup>54</sup> We assume there to be three operators at each site for the purposes of illustration.

**Figure 6.2: Savings in consumer-based mitigation costs as a result of mobile network-based mitigation at individual operator's sites <sup>55</sup>**



Source: Ofcom analysis

6.20 As can be seen from Figure 6.2, for some sites the potential consumer cost savings are considerable.

**The costs of network-based mitigation at a particular base station are hard to quantify in advance**

6.21 The impact of reducing power will vary by site, but all other things being equal, a power reduction will tend to reduce the coverage and capacity of the site, although by how much will depend on various factors such as what other frequency holdings an operator has, and how heavily loaded its network is.

6.22 In our June 2011 consultation, we attempted to quantify the cost of installing higher quality base stations filters, and we estimated that these would cost around £400 per base station. However, some mobile operators told us that there could be additional costs on mobile operators of installing higher quality filters if, for example, there was limited space at the base station. This is one of several reasons why it is difficult for us to estimate in advance the costs of network-based mitigation for any particular base station.

6.23 The extent of network-based mitigation will depend on the costs to new licensees. As it is difficult to estimate the cost of network-based mitigation, it is not clear how much network-based mitigation operators will undertake. However, for the purposes of illustration we have estimated the number of sites at which each operator might apply network-based mitigation.

<sup>55</sup> The cost savings shown assume that there are three operators at each location, and that a 50:50 gainshare operates, so that new licensees benefit from 50% of the consumer savings costs

6.24 If the cost to an operator per base station is less than a particular threshold (say £5,000) then an operator will only undertake network-based mitigation at that base station when the benefits (in the form of consumer mitigation savings) it will gain are greater than this threshold. Table 6.5 shows the number of sites at which network-based mitigation would be economic for a given threshold and also the total cumulative saving to Mitco. In practice the threshold for a base station is likely to depend on a range of factors, and particularly its location.

**Table 6.5: Number of sites undergoing mitigation and total consumer cost savings**

Threshold per operator for applying network mitigation <sup>56</sup>	Number of sites undergoing mitigation	Consumer mitigation savings (To Mitco)
£15,000	20	£3m
£12,500	30	£3m
£10,000	40	£4m
£7,500	80	£6m
£5,000	150	£9m

*Source: Ofcom analysis*

6.25 As can be seen from Table 6.5, it is clear that there are a number of base stations for which applying even relatively limited network-based mitigation can potentially deliver substantial cost savings to Mitco. However, the number of sites for which operators will actually choose to apply network-based mitigation will be sensitive to their view on the appropriate threshold.<sup>57</sup>

## Platform changes

6.26 Where DTT receiver filtering fails to restore DTT services, a household will be entitled to receive a platform change when it exclusively relies on DTT for receiving TV (i.e. that it does not have a cable or satellite service). Post-DSO we assume that this will be around 40% of households<sup>58</sup>, although for the purposes of estimating costs we have allowed for a further 10% of households.<sup>59</sup>

<sup>56</sup> This takes into account the gainshare mechanism

<sup>57</sup> In Section 5, we presented estimates for the numbers of households likely to still be affected after various levels of mitigation had been applied. Mitigation case (e) as presented there was defined with reference to the cost saving calculations shown here, i.e. we looked at the number of households still affected by interference after network based mitigation is applied at the 150 base stations where doing so could result in each of them potentially making consumer mitigation cost savings of £5,000 or more.

<sup>58</sup> Based on current Ofcom figures on the number of primary DTT households (i.e. those that only use DTT).

<sup>59</sup> We have allowed for a significant margin of error in being able to identify whether a household is a primary DTT household or not. Households may have an incentive to “game” the system and claim for an installation that they are not entitled to. In order to not underestimate the costs we have erred on the side of caution and included 10% for potential “false claims”. MitCo will obviously have a strong incentive to verify any platform change claims.

- 6.27 Coverage of satellite and cable is not universal, and we estimate that between 1-3% of households cannot receive either of these alternative platforms. To illustrate the worst case we have used a figure of 3%.<sup>60</sup> Because these households cannot obtain an alternative platform, they will necessarily be relying on DTT as their primary means of receiving digital television.
- 6.28 In the absence of any network-based mitigation, we estimate that there might be approximately 38,000 households for whom DTT filtering fails to restore DTT services and who therefore still experience interference. Of these around 18,000<sup>61</sup> would receive a platform change. We note that, based on our sensitivity analysis, this number could be reduced to less than 10,000<sup>62</sup> if these consumers were provided with DTT equipment that is less susceptible to interference. It will be for MitCo to judge whether it is practicable and cost-effective to use this alternative approach.
- 6.29 Alternatively, the number of platform changes could be reduced through network-based mitigation. For the purposes of illustration, we have compared the number of platform changes in Case (b) (see Table 5.1); where there is no network-based mitigation with the number of platform changes when there is network-based mitigation at a limited number of sites. This is shown in Table 6.6 below.

**Table 6.6: Number of platform changes and households subject to special measures in the central scenario where different levels of network mitigation are applied.**

Number of sites where network-based mitigation is applied	Platform changes	Entitled to a platform change but cannot receive one
0	18,100	1200
20	14,500	900
30	13,700	900
40	12,400	800
80	10,400	700
150	8,100	500

Source: Ofcom analysis

<sup>60</sup> This figure is based on 6% of households being unable to receive satellite, and 50% of those being unable to receive cable. Sky estimates that satellite coverage is around 98%, and previous Ofcom estimates of satellite coverage range from 94% to 98%. The 94% figure included households that could not install a satellite dish due to planning regulations, and these planning regulations have since been relaxed, so 3% is likely to be an overestimate of the true figure.

<sup>61</sup> Based on 40% primary DTT households plus 10% margin for overclaiming, minus 3% who cannot actually receive an alternative platform

<sup>62</sup> See Table 24 in the accompanying technical report

### **Platform changes are likely to have a limited impact on the DTT platform**

- 6.30 The Government has decided that there should be a cap on the number of platform changes offered, but considers that this cap should be kept flexible until there is greater clarity on the scale of the interference issue.<sup>63</sup>
- 6.31 As discussed above, with no network-based mitigation our revised technical analysis indicates that there would be up to 19,000 platform changes offered. Even if Government decide to set a cap which is tighter than this, it should be relatively easy to meet it with a combination of improved DTT receivers and the use of some network-based mitigation, although there is no direct obligation on Mitco or new licensees other than through a platform change cap. The potential impacts on DTT coverage are described in Section 5.

### **A very limited number of households may lose access to some TV services**

- 6.32 In the absence of any network-based mitigation, around 1,200 households<sup>64</sup> may be entitled to a platform change but unable to receive one. Again, the use of network-based mitigation or DTT equipment which is less susceptible to interference would be likely to reduce this number.
- 6.33 For any household that is unable to receive a satellite or cable service and for whom DTT filtering (or replacing DTT equipment with equipment less susceptible to interference) fails to restore DTT services, MitCo will be required to undertake special measures to try and restore digital TV services and will be required to spend up to £10k per household in doing so.

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<sup>63</sup> We discuss how such a cap might be imposed in Section 7.

<sup>64</sup> Even these households would be unlikely to completely lose reception of all DTT multiplexes. Rather, the loss of reception would likely be limited to one or two multiplexes received on UHF channels 59 or 60. Of these households, approximately 50-60% would lose access to one or more PSB multiplexes.

## Section 7

# MitCo

## Introduction

- 7.1 In our June 2011 consultation, we presented our initial proposals for the establishment of a single organisation to manage the provision of information and support to consumers which we referred to as MitCo. As set out in Section 4, most respondents agreed that a single body was needed, but they also thought that the model we presented for consultation required further work.
- 7.2 As explained in Section 3, Government has decided that MitCo should be jointly owned and operated by new 800 MHz licensees.
- 7.3 Government has not yet decided how MitCo is to be created, and whether or not this should occur prior to, or after, the auction.<sup>65</sup> If MitCo is to be set up in advance of the auction, it is likely that Government would need to do this before transferring all or part of it to the new 800 MHz licensees after the auction. Government has also yet to decide whether it wishes to retain a shareholding in MitCo, or whether it would prefer the entire ownership and responsibility for MitCo to pass to the licensees. Discussions on these points are still ongoing between Ofcom and Government. In the meantime, however, we leave open the possibility that Government may, itself, be a shareholder in MitCo or, alternatively, that Government may decide to contract with MitCo once the licensees have assumed the ownership of that body.
- 7.4 Government has decided that MitCo will need to be overseen by a Supervisory Board and that members for this Board should be drawn from those with a key interest in successful mitigation, including Government, Ofcom, the broadcasters and multiplex operators, the new 800 MHz licensees and consumer groups.
- 7.5 The Government has also indicated that it is important that a clear set of key performance indicators are established and agreed for MitCo.
- 7.6 In order to implement Government's decisions there remain a number of further questions that need to be addressed.
- 7.7 In this section, we present our analysis and policy proposals for the detailed implementation and design of MitCo and the Supervisory Board, including:
- Overview of MitCo and the Supervisory Board;
  - Three phases of MitCo's operations;
  - Establishing MitCo;
  - MitCo's constitution and governance;
  - Funding MitCo and the Supervisory Board;
  - Managing MitCo's performance;

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<sup>65</sup> We do not consider that Ofcom has a power to set up MitCo.

- MitCo interaction with other parties;
- Managing strategic behaviour;
- Enforcement;
- Support for vulnerable consumers;
- Closure arrangements for MitCo.

7.8 Under each section, we present key questions on which we are consulting.

## Overview of MitCo and Supervisory Board

- 7.9 The purpose of MitCo will be to manage the mitigation of interference suffered by DTT consumers as a result of use of the 800 MHz band, by delivering the level of support to DTT consumers described in Section 3. We propose that the quality of such support will be defined by Key Performance Indicators (KPIs) which MitCo will be required to meet.
- 7.10 MitCo will be responsible for consumer-based mitigation. It will need to deliver this mitigation through a range of services, including providing DTT consumers with information and advice, filter distribution, and, as appropriate, platform changes and an installation service for vulnerable groups.
- 7.11 Licensees in the 800 MHz band will be required to co-ordinate their mitigation activities via MitCo, and it is through this body that licensees will be able to identify where it may be appropriate to implement network-based interference mitigation. As noted in Section 3 the Government has determined that the new 800 MHz licensees should fund MitCo up to £180m, above which Government would bear any overspend risk. This £180m is intended to pay for consumer-based mitigation (with £20m of this amount intended to cover the cost of providing additional support for vulnerable consumers). The licensees will have to fund any network-based mitigation themselves, but will benefit from such mitigation via the gainshare mechanism under which spend below £180m is shared 50:50 between Government and the licensees.
- 7.12 The performance of MitCo will be monitored by a Supervisory Board, which will assess performance against KPIs and provide advice, as appropriate, on the enforcement of particular obligations to which licensees are subject<sup>66</sup>. The Supervisory Board should have sufficient technical capabilities and decision-making procedures to understand, evaluate and constructively challenge MitCo performance against KPIs on a timely basis.

## Three phases of MitCo's operations

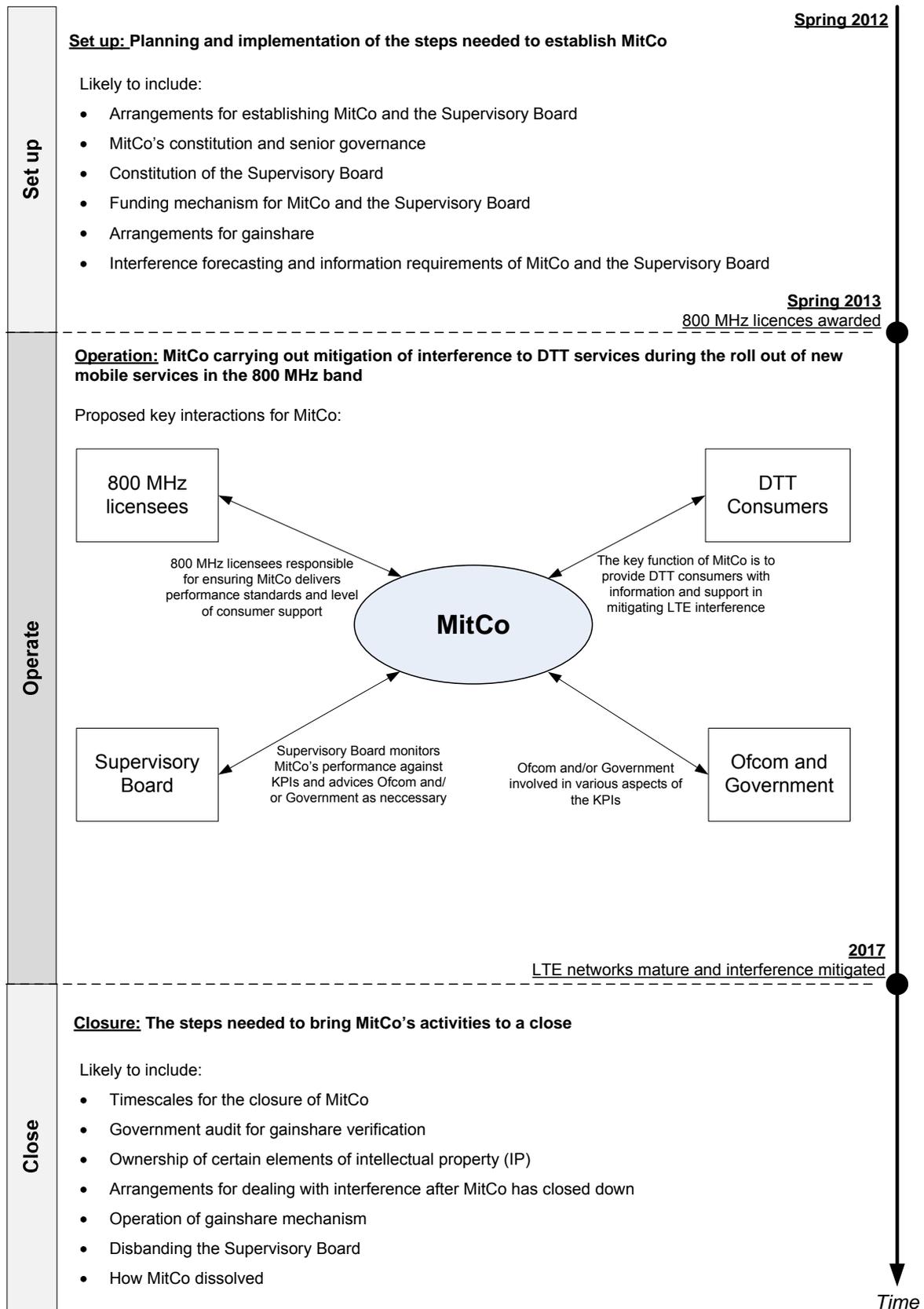
- 7.13 There are three phases to MitCo's role: a setup phase, an operating phase, and a close down phase. The diagram in Figure 7.1 below sets this out and captures some of the key features.
- 7.14 Taking each phase in turn:

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<sup>66</sup> Either under the conditions of their licences or possibly, where there are shareholders' or funding agreements in place, the obligations on licensees under those agreements.

- The “Set up” phase lasts until the new licensees take over ownership of MitCo. The challenge is to capture in licence conditions, governance processes or MitCos constitution all the key aspects of the operate and close down phases. We need to strike a balance between ensuring Government’s decisions are implemented versus allowing the licensees sufficient flexibility to run MitCo efficiently and meet their KPIs.
- The “Operate” phase is when MitCo is actually undertaking mitigation, overseen by the Supervisory Board.
- The “Close down” phase occurs when MitCo has completed undertaking its mitigation activities. A backstop date of 2017 has been set for this by Government although the owners of MitCo may apply for an earlier closedown via the Supervisory Board.

**Figure 7.1: Phases of MitCo operation**



## Establishing MitCo

- 7.15 There are a number of options for how and when MitCo might be established as a body through which 800 MHz licensees operate. The key objectives in considering establishment are that:
- Certainty is provided to future 800 MHz licensees and other stakeholders ahead of the auction on what interference mitigation capabilities will be in place;
  - the process of creating MitCo, and ensuring that its readiness to begin effective operations, does not unduly hinder the roll out of 800 MHz licensees' networks; and
  - MitCo's capabilities, which will ultimately be controlled by 800 MHz licensees, are fit-for-purpose.
- 7.16 We have set out below two options for establishing MitCo. They consist of either:
- Government establishing MitCo before the auction; or
  - the new licensees establishing MitCo after the auction.
- 7.17 Both options assume that MitCo will be set up as a limited company, although we note that other structures may be possible. Whether MitCo is set up before the auction, or afterwards, we expect that it will be funded by the new licensees, and set out the detail of those arrangements further below.

### **Option 1: Government establishes a limited company before the auction, and 800 MHz licensees become shareholders/owners after the auction**

- 7.18 Under this option, Government would, before the auction, set up MitCo as a limited company. We are open as to whether this would be a company limited by guarantee or by share capital, but we believe that a company limited by share capital offers the best construct for providing services to the consumer and then being able to release a value to shareholders, i.e. the new licensees, on dissolution. A company establishes a single legal personality, and therefore a single point of accountability, for the range of consumer mitigation support that needs to be delivered. As part of this option, the Government could, on behalf of MitCo, begin negotiations with suppliers, for example contact centre services, and postal/distribution services.
- 7.19 After the auction, the 800 MHz licensees would become shareholders in/owners of MitCo. There are two ways this might occur.
- 7.20 First, Government might choose to remain a shareholder itself, and transfer to the 800 MHz licensees the remaining shares in allocations proportionate to their respective 800 MHz spectrum holdings.
- 7.21 Alternatively, Government might decide to transfer the entirety of its holding in MitCo to the 800 MHz licensees, again in shares proportionate to their respective spectrum allocations.
- 7.22 Government has not yet decided the level of involvement (if any) that it wishes to retain in MitCo after the 800 MHz licensees become shareholders/owners.

- 7.23 The benefit of Option 1 is that key aspects of MitCo's constitution can be established and clarified ahead of the auction. It is also likely to be the quickest way of having MitCo operationally ready as the organisation will be in existence before the auction has been completed. Furthermore, it means that new licensees do not have to reach agreements with each other as to how MitCo should be set up and created.
- 7.24 The potential problems with Option 1 are that it removes some potentially key decisions related to efficient operation of MitCo from new licensees. There is a risk that the new licensees are left with an organisation that does not operate as efficiently as it might have done. This could mean in turn that more money is spent carrying out mitigation, or potentially the mitigation takes longer to implement, than might otherwise have been the case.
- 7.25 However, it should be noted that the operations of MitCo, including the contracts it may establish with suppliers, for say, contact centre services, postal / distribution services, could be left to MitCo after licensees have become shareholders of the entity. That is, MitCo could be established as a 'shell' with a constitution defined in its Memorandum and Articles, but short of it making contractual commitments and establishing operations. This would allow licensees a greater level of control after the auction.

**Option 2: The establishment of MitCo is the responsibility of the new 800 MHz licensees after the auction**

- 7.26 Under this option Government would not set up MitCo. Instead the new 800 MHz licensees would be required to set up MitCo once they had won 800 MHz spectrum in the auction.
- 7.27 This requirement would take the form of an obligation that new licensees co-ordinate to create a single body to manage interference, possibly in a manner specified by Ofcom which may set out in advance the key features that any such body should encompass. We envisage that this obligation would be included in each 800 MHz licence.
- 7.28 An alternative means of achieving the same outcome would be for Government to enter into some form of agreement, likely to be contractual, with each of the 800 MHz licensees to form a body such as MitCo for the purposes of undertaking mitigation.
- 7.29 We address below the first variant, namely where the obligations on licensees are included in the 800 MHz licences, as this is the option within our control.
- 7.30 Option 2 has the potential benefit of allowing 800 MHz licensees to take detailed decisions on establishing MitCo and determining how it will operate to deliver against the KPIs to be set by Ofcom. This could ensure the optimum trade-off between MitCo being able to mitigate interference quickly, efficiently and effectively, while also meeting the KPIs.
- 7.31 Option 2 suffers from needing more time for MitCo to reach an operational state compared to Option 1. This is the result of new licensees not being able to start work properly on creating MitCo until the outcome of the auction is known. There is also the risk that new licensees take time to agree the setting up of MitCo due to different licensees having different objectives and roll out plans for example.

- 7.32 The impact will depend to some extent on when the auction finishes and when operators might want to begin 800 MHz deployment. However, there is a risk of a potentially material delay in new licensees being able to use their spectrum.
- 7.33 To minimise this delay, Government, Ofcom or a third party could undertake a detailed 'MitCo set up preparation' exercise, effectively to provide new licensees with a pack of information likely to be relevant to setting up MitCo quickly and efficiently.
- 7.34 To ensure the MitCo set up preparation met the requirements of new licensees we would expect that before the auction took place any parties interested in bidding for 800 MHz spectrum would be able to meet with the MitCo set up preparation team. Additionally, we could provide a further optional opportunity to accelerate the setting up of MitCo. Subject to stakeholder views on practicalities and availability of relevant resources, we could allow for preparatory discussions to continue during the award process. The optional discussions would involve the organisations who had qualified to bid in the auction and had sufficient eligibility to bid on 800 MHz spectrum, therefore involving a focused group of potential users of the 800 MHz band. Their purpose would be to provide an opportunity for relevant bidders to provide more information on the work they would like to be undertaken to set up MitCo. Holding these discussions then might allow a few weeks to be saved in the overall process, i.e. the time between the qualification of applicants and the conclusion of the award process.
- 7.35 The preparatory work could include:
- *Design of MitCo's governance* and high level structure, including a draft Memorandum and Articles and of Association
  - *Strategic design* of key elements of service provision, e.g. online portal design and functionality, information campaign targeting and leaflet design / copy
  - *Contract design*, short of commercial agreements with suppliers – on the whole, contract design, including payment terms and general terms and conditions will be a significant undertaking

### **Provisional conclusions on establishing MitCo**

- 7.36 Our initial view is that it is relatively more important to set up MitCo before the auction than after it. This is to limit the potential for delay in bringing spectrum into use, as well as establishing clarity and confidence amongst all stakeholders with regards to how MitCo would be constituted. Setting up after the auction is more likely to result in delay and would provide less certainty.
- 7.37 As a result we consider that Option 1 is the preferable option. The benefits of option 1 (minimising the risk of delay to network roll out by setting up MitCo before the auction), are likely to outweigh the benefits in Option 2 (a more efficient MitCo that is likely to result from the new licensees taking all the decisions on setting up MitCo rather than government taking those decisions).
- 7.38 We also consider that the risks related to Option 1 (MitCo not being set up as the new licensees would ideally like and being less efficient as a result) are easier to mitigate and have the potential to cause less impact than the risks related to Option 2 (possible significant delay in MitCo being set up).

- 7.39 It is important to note that the way that Option 1 is undertaken and in particular what shareholding Government might decide to retain or not in MitCo is a matter for further consideration by Government. Ofcom will need to work closely with Government if Option 1 is considered to be the best option.

*Question 7.1: Do you agree that it is best to seek to establish MitCo in advance of the auction for later transferral to 800 MHz licensees?*

## MitCo's constitution and governance

- 7.40 If Option 1 is chosen (to establish MitCo before the auction) then MitCo's constitution will need consideration. If Option 2 is chosen then it is useful for potential new licensees to understand how we consider MitCo might be constituted.

### MitCo's constitution and governance

- 7.41 There are in our view various ways in which MitCo could be constituted: for example, it could be a limited company, with a board of directors and the usual corporate constitutional instruments (e.g. a Memorandum and Articles of Association); alternatively it could be run as a partnership. Either of these options would be capable of reflecting in the ownership structure the 800 MHz licensees' respective level of 800 MHz spectrum holdings.
- 7.42 We consider that whichever structure is ultimately chosen, the following factors are likely to be important:
- MitCo's mission and objectives, namely to provide interference mitigation support to consumers of DTT in line with specified KPIs;
  - MitCo's relationship and reporting obligations to the Supervisory Board, which could be set out in, for example, an MoU with, or letter to, the Supervisory Board;
  - The composition of the governance structure for MitCo, and the processes for changing the identity of those responsible for managing MitCo;
  - The likely need for MitCo to have an independent Chairperson/CEO, with a casting vote in the case of deadlock amongst the remaining management of MitCo;
  - MitCo's decision-making processes, including appropriate internal scrutiny of its operations and decisions (in addition to supervision by the Supervisory Board);
  - provisions relating to the dissolution of MitCo, including (but not limited to) the gainshare arrangements between the 800 MHz licensees and Government (these are discussed in more detail below); the distribution of the fixed tangible assets and current assets (including any shareholding capital); and where MitCo may need to account for any intellectual property rights. On this last point, for example, basic branding and technical modelling capabilities, might transfer to the Government, in order to enable it to control any further consumer-based mitigation that is required beyond the end of its life.

*Question 7.2: Do you agree with our initial views on MitCo's constitution and governance?*

## The Supervisory Board

7.43 Government has decided that it will establish a Supervisory Board oversee to MitCo. The following sub-section presents our views on the purposes and constitution of the Supervisory Board.

7.44 Ofcom expects to use the outcome of this consultation to provide information to assist Government when it establishes the Supervisory Board.

### Purpose of the Supervisory Board

7.45 The purpose of the Supervisory Board is to monitor MitCo's performance against the KPIs. On the basis of its considerations it will advise Ofcom (or Government if they decide to follow a contracting model) as the body with powers of enforcement.

7.46 We believe the key functions of the Supervisory Board will be to:

- *Monitor MitCo performance* on an ongoing basis against the KPIs, which are either specified in the new licences, or in a shareholders' or funding agreement between Government and 800 MHz licensees;
- *Accredit significant one-off aspects* of MitCo's service, e.g. the design of the online portal, or the information campaign so as to ensure key aspects of MitCo's delivery represent an adequate standard of service;
- *Advise MitCo* on general issues of performance. This, it is envisaged, would be informal advice that supports MitCo in delivering a high quality, cost-effective service to DTT consumers, supported by the Supervisory Board receiving management information on complaints and any 'softer' issues not represented in formal KPIs;
- *Advise Ofcom* on reported non-compliance by MitCo or the licensees with the terms of their licences, in particular, the KPIs.

7.47 To fulfil its remit, it is likely that the Supervisory Board will need information from MitCo on its performance. A set of reporting requirements will therefore need to be agreed between the Supervisory Board and MitCo.

### The constitution of the Supervisory Board

7.48 The constitution of the Supervisory Board should be designed so as to enable it to act quickly and effectively. We consider that this means it will need to be:

- *Streamlined* in terms of its decision-making processes;
- *Representative* of the range of stakeholder interest in DTT mitigation; and
- *Technically capable* to understand the detail of MitCo's performance.

7.49 The following table proposes the senior membership for the Supervisory Board. This membership would be supported by 'expert-level' resources. For simplicity we have shown just three 800 MHz licensees in the table. If the outcome of the award resulted in a different outcome to this the number of broadcasting representatives would need to be adjusted accordingly. The important principle is that a balance between 800 MHz licensees and broadcasting representatives is maintained.

**Table 7.1: Senior membership of the Supervisory Board**

<b>Membership</b>	<b>Role</b>	<b>Voting</b>
Chairperson (independent appointee or Government official)	Acts independently of any vested interest so as to deliver the remit of the SB	Casting vote
MitCo's Chief Executive Officer or equivalent	Represents the management of MitCo	Non-voting status, information provider
Government (DCMS)	Represents Government interest as the financial 'under-writer' of MitCo and a responsible department for the policy	Observer status or Chairperson
Ofcom	Informed as the authority responsible for managing the spectrum and enforcing licence conditions	Observer status, otherwise conflicted
Technical / audit advisor (independent appointee)	Represents audit and technical compliance aspects of MitCo's performance. Appointed jointly by Government and Ofcom	Voting status
Consumer interest advisor (independent appointee)	Represents consumer aspects of MitCo's performance. Appointed jointly by Government and Ofcom	Voting status
MuxCo-representative	One representative of the multiplex operators	Voting status
PSB-representative	One representative of the public sector broadcasters	Voting status
COM-representative	One representative of the commercial broadcasters	Voting status
800 MHz licensee 1	Represent 800 MHz licensee	Voting status
800 MHz licensee 2	As above	Voting status
800 MHz licensee 3	As above	Voting status

7.50 Beneath its senior membership, we envisage that the Supervisory Board would be supported by the following resources (referred to collectively below as the "expert level function"):

- A *secretariat*, to support the Supervisory Board members in preparing information and to manage the following two functions below:
- A *technical modelling* function, with sufficient expert modelling capability to allow it to challenge and evaluate MitCo performance against forecast interference and assess performance against KPIs; and

- An *audit function* with sufficient expertise to conduct audits of information provided by MitCo on a quarterly basis, as well as its financial management, and from time to time to conduct surveys of MitCo's operations including consumer surveys.

7.51 In terms of decision-making processes we envisage that:

- The Supervisory Board's senior membership would meet when key decisions are required, probably on a monthly basis or as otherwise called by the Chairperson on advice from the expert-level function.
- The expert-level function would interact with MitCo on a more regular basis (e.g. weekly or fortnightly) to manage the flow of information. The precise detail of this interaction would be agreed between the Supervisory Board and MitCo's management.
- Voting amongst the senior membership will be between all members on an equal basis, with a casting vote exercised by the Chairperson.

7.52 A final important element relates to the appointment of the Chairperson. We consider that there are two options for this:

- an independent appointee by Government and Ofcom; or
- a Government official.

*Question 7.3: Do you have any views on the proposed approach to the Supervisory Board.*

## Funding MitCo and the Supervisory Board

### Funding

- 7.53 Both Mitco and the Supervisory Board will need funding to function. Government has decided that MitCo should receive a fixed amount of funding of £180m, subject to (i) any underspend being shared between Government and the 800 MHz licensees, and (ii) any overspend being covered by Government.
- 7.54 Government has decided that this funding will be sourced from the successful bidders for the 800 MHz licences, but the exact mechanism for doing so is still to be agreed with HM Treasury.
- 7.55 The amount each new licensee is required to pay will be determined in proportion to the quantity of 800 MHz spectrum that they have won in the auction. Therefore if, for example, a licensee has won 2x10MHz of spectrum out of a total of 2x30MHz of 800 MHz spectrum available in the auction, it would pay £60m. We envisage that an obligation to provide this funding as set out above would be included in each 800 MHz licence to be auctioned and address this further in Section 8.
- 7.56 Government has also decided that the Supervisory Board should be funded from within the overall allocation of £180m, which has been estimated with an allowance for the Supervisory Board's running costs. We expect that such costs should be around £1.2m per annum.

7.57 Any funding not spent by the Supervisory Board would be accrued by the Board until MitCo is closed down. At that point the total funds left over would be returned to MitCo to be distributed via the gainshare.

## Gainshare

7.58 As noted above the Government has decided that the total available funding for Mitco should be £180m. If the costs of running Mitco are more than this, new licensees will not be responsible for providing additional funding.

7.59 In the event that Mitco's expenditure is less than £180m, the residual funds will be subject to a "gainshare" mechanism. Government has decided that the residual funds should be split 50:50 between the Government and the 800 MHz licensees. However, it has not specified how the 50% should be divided between those licensees.

7.60 In this sub-section we discuss both how to determine how the gainshare should be split between new licensees and whether this split could be changed after Mitco has been set up.

7.61 The aims of the gainshare mechanism are twofold:

- To encourage the shareholders in MitCo (the new licensees) to run it as efficiently as possible; and
- To help provide an incentive for new licensees to undertake network mitigation where it is efficient for them to do so.

7.62 Although the maximum revenue each licensee might receive from the gainshare is relatively small (relative to the potential cost of the 800 MHz licences and network deployment), it is important that the potential to make money from the gainshare does not distort the incentives for bidders in the 800 MHz auction. The gainshare split should therefore reflect the two aims above, whilst minimising the risk of distorting the auction.

7.63 The split of the gainshare could be determined in two ways:

- Based on an assessment of what contribution each licensee makes to interference and hence to the costs of Mitco.
- Split between the licensees based purely on the amount of spectrum (in MHz) each licensee holds<sup>67</sup>.

7.64 To inform this choice we have looked at the extent to which the contribution to interference and hence mitigation costs varies within the 800 MHz band. We have analysed three equal-size 2x10MHz blocks of 800 MHz spectrum.<sup>68</sup>

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<sup>67</sup> That is, if one operator held 2x20 MHz, whilst another held 2x10 MHz of 800 MHz spectrum, the first would receive 2/3 of the available gainshare, and the second would receive 1/3 of the available gainshare.

<sup>68</sup> We note that the current proposal is to auction spectrum in 2x5 MHz units, but for the purposes of illustration we have analysed the spectrum in 2x10 MHz units and assumed that there are three operators, each with 2x10 MHz. This is merely for illustrative purposes and implies nothing about auction outcomes.

7.65 Table 7.2 shows the number of households affected when each 2x10 MHz block transmits on its own.<sup>69</sup>

**Table 7.2: Number of households affected with different blocks transmitting**

<b>Blocks transmitting (2x10 MHz blocks)</b>	<b>No of households affected</b>	<b>% contribution</b>
Block A (lowest frequency block)	170k	37%
Block B (middle frequency block)	145k	31%
Block C (highest frequency block)	141k	30%

*Source: Ofcom analysis*

7.66 Block A contributes around 37% of the interference, with the other two blocks contributing an approximately equal contribution.

7.67 In our view, the difference in interference levels between the blocks and the likely scale of the gainshare are not large enough to justify the first of the two approaches above, and we therefore propose that the gainshare should be divided in proportion to each licensee's 800 MHz spectrum holdings. However, we do not propose to fix the allocation between licensees in an absolute sense. We propose to suggest a proportionate allocation of the gainshare as a starting point from which licensees may seek to negotiate an alternative split.

7.68 We note that this would support an approach under which lots in the 800 MHz band are generic for the purposes of the principal stage of the forthcoming auction (subject to the implications of any coverage obligation).

*Question 7.4: We propose that the 50% gainshare be split between 800 MHz licensees based on the volume of spectrum they hold in the 800 MHz band. Do you have any comments on this proposal?*

## Managing MitCo performance

7.69 In this sub-section we consider proposals to manage MitCo's performance throughout the life of its operations to ensure that it delivers the Government's consumer support decisions, including the definition of MitCo's performance requirements in a set of outcome based Key Performance Indicators (KPIs). In this context we also consider how any obligations on MitCo and/or the 800 MHz licensees might be enforced.

7.70 This sub-section firstly considers the information that MitCo is likely to need to obtain in order to carry out its functions. We then go on to consider some of the key

<sup>69</sup> The effect of interference when all three blocks transmit is not the simple sum of each of them transmitting individually; however this effect does not materially affect the conclusions in this sub-section.

processes that may need to operate alongside the KPI framework to ensure the incentives remain consistent and that MitCo is able to deliver effective service provision. These include the mechanisms for reporting service outputs and amending performance targets and the data requirements to support the accurate identification of eligible consumers.

## **Interference forecasting and information requirements**

- 7.71 The ability to accurately predict levels of interference to DTT receivers is likely to be a key capability for MitCo. As levels of interference drive demand for mitigation services, accurate forecasting of when and where interference is likely to occur is the chief enabler of efficient service provision, through the identification of affected regions and the targeting of support. In addition, accurate demand forecasting provides a baseline for assessing MitCo's performance in providing mitigation services, notably with regard to the efficient proactive distribution of filters and the supply of platform changes.
- 7.72 There are a range of information parameters we consider likely to be necessary for the accurate forecasting of DTT interference. These are principally concerned with mobile network data from 800 MHz licensees and broadcast network data from DTT broadcasters, with the addition of demographic and UK household data to determine accurately the profile of dwellings in specific regions.
- 7.73 The full range of information requirements we consider necessary for the operation of an effective interference forecasting capability are detailed in Annex 5.
- 7.74 The data requirements specified in Annex 5 are likely to constitute ongoing inputs into an interference forecasting model operated by MitCo to inform the targeting and coordination of its service delivery. We expect that MitCo will aim to develop and refine this model over time to improve the accuracy of its forecasting as 'real world' data becomes available from MitCo's operations.
- 7.75 To mitigate the risk that development of the interference forecast model may impact the network roll out strategies of the 800 MHz licensees, we consider it necessary that an initial forecast tool, potentially in a form similar to the model used by Ofcom to generate interference forecasts, should be procured by or provided to MitCo at the outset of its activities.
- 7.76 We propose that the Supervisory Board will be responsible for validating that the interference forecast model operated by MitCo is appropriate and reliable. It will also be responsible for approving any changes to the validated model.
- 7.77 We believe it will be necessary for the Supervisory Board technical function and MitCo to have the same version of the interference forecast model, with the same technical inputs. This is so that the Supervisory Board can test its robustness and accuracy against 'real world' outputs on an ongoing basis. It will also be necessary as some of the KPIs require the output of the technical modelling for measuring performance. We also consider that only the Supervisory Board should be permitted to approve any changes to that interference model, although they can be proposed by MitCo, to mitigate the risk of MitCo gaming KPI targets by altering the model at will.
- 7.78 We note that any information passed to the Supervisory Board from MitCo will need to be handled under a clear set of defined rules. This might extend to NDAs between

the Supervisory Board and MitCo to protect what could be commercially sensitive data and ensure it is properly protected.

*Question 7.5: Are the information parameters defined above and in Annex 5 sufficient to allow MitCo to accurately and reliably forecast the scale and scope of households affected by DTT interference?*

## Key Performance Indicators

- 7.79 We set out below a proposed set of Key Performance Indicators (KPIs). These are designed to ensure that the level of consumer support chosen by Government is delivered by MitCo. They are based on the activities and service objectives that MitCo is expected to need to deliver to achieve the chosen consumer support level.
- 7.80 Each KPI comprises a basic requirement (referred to below as the performance standard) which defines the detailed obligation which is to be met. In the event that the performance standard is not met, a set of “Operational Conditions” will automatically apply with respect to that KPI, setting further conditions which must be complied with until the relevant performance standard has been satisfactorily met. We set out more detail below in relation to Operational Conditions.
- 7.81 We consider that all 800 MHz licensees should be collectively responsible for MitCo and its activities, including ensuring that MitCo complies with its KPIs. Similarly, where MitCo fails to meet the performance standards set out in the KPI, we consider that the Operational Conditions which attach to those KPIs will apply to each licensee equally.
- 7.82 The KPIs we have developed for MitCo have three broad aims. They are designed to:
- Incentivise MitCo to deliver the level of consumer support determined by government and deliver that support to a high standard;
  - Provide a clear and objective framework to assess MitCo’s performance on an ongoing basis; and
  - Allow for the timely and responsive identification of areas of poor performance to help minimise the impact of DTT interference on affected consumers.
- 7.83 The KPIs for MitCo have been developed in line with a series of design principles to ensure that they are practical and appropriate. The KPIs are intended to be:
- SMART<sup>70</sup>;
  - linked to evidential service outputs;
  - objective with a clear and discernible indicator of failure;
  - transparent; and
  - rules based and responsive with regards to reporting and verification.

<sup>70</sup> Specific, Measurable, Achievable, Relevant and Time framed

- 7.84 Under the consumer support level chosen by Government (see Section 3), MitCo’s activities will principally be concerned with:
- The supply of *information* to consumers;
  - The timely *distribution of filters* to households affected by DTT interference (with an emphasis on supplying filters prior to interference occurring where practical);
  - The timely supply of *installation support* to “vulnerable” consumers, where vulnerability is determined by criteria stipulated by Government; and
  - The supply of *platform changes* and other forms of bespoke mitigation.
- 7.85 The KPI framework developed for MitCo is structured around this scope of activities.
- 7.86 Regarding the distribution of filters we use the terms proactive and reactive. Proactive refers to when a filter is sent to a household before the base station is switched on. Reactive refers to when a filter is sent to a household after that household has experienced interference and has requested a filter from MitCo.
- 7.87 Table 7.3 below outlines our proposed KPI framework. Each KPI has been given a name for ease of reference.

**Table 7.3: Proposed KPI framework**

<b>KPI Name</b>	<b>Service objective</b>	<b>KPI(s) performance standard</b>
① Information supply	Affected households supplied with sufficient information in good time before interference occurs to enable them to make appropriate mitigation decisions	99.9% of households forecast to have interference within a 2km <sup>71</sup> radius of a 800 MHz base station are sent information at least 1 calendar month, and no earlier than 3 calendar months, before planned base station activation
② Proactive filter supply	A proportion of households forecast to be affected by DTT interference have the problem corrected before it occurs	No more than 10% of households forecast to be affected by DTT interference in a 1.5km <sup>72</sup> radius of a 800 MHz base station should request a reactive filter within 1 calendar month following activation of a base station
③ Reactive filter supply	Households experiencing interference receive mitigation in a timely manner	At least 91% <sup>73</sup> of filters are delivered within 2 working days of customer requirement confirmation  At least 98% of filters are delivered within 4 working days of customer requirement confirmation  At least 99.9% of filters are delivered

<sup>71</sup> Currently proposed geographical area around a base station is indicative only based on analysis of Ofcom interference modelling that indicates that 99.9% of households expected to experience interference are within 2,000m of a base station

<sup>72</sup> Currently proposed geographical area around a base station is indicative only based on analysis of Ofcom interference modelling that indicates 99% of households expected to experience interference are within 1,500m of a base station.

<sup>73</sup> KPI targets based upon average performance of a large scale UK distribution and logistics company over the last five quarters to Qtr 3 2011, with the inclusion of an additional day to allow for internal job processing within MitCo.

		within 5 working days of customer requirement confirmation
④ Vulnerable consumer support	Eligible households who are unable to self-install filters receive installation support in a timely manner with minimal disruption	99.9% of installations for eligible vulnerable households completed within 8 working days <sup>74</sup> from visit requirement confirmation by the Contact Centre  98% <sup>75</sup> of vulnerable households in an area experiencing interference and requiring installation support receive a 'first time fix'
⑤ Platform change supply	Households where filters are ineffective receive a platform change in a timely manner	99.9% of platform changes for eligible households completed within 8 working days from confirmation of a platform change requirement by the Contact Centre
⑥ Consumer complaints	MitCo seeks to minimise the occurrence of consumer complaints and responds promptly to issues	No more than 5% of eligible households in an area that require a reactive filter should complain that they have not received a filter after 5 working days  No more than 5% of eligible vulnerable households in an area that have requested an installation service should complain that they have not received such a service after 9 working days.

7.88 KPIs ② and ⑥ have specific challenges related to how they are defined and measured. Therefore we have provided some additional discussion about these two in the following sub sections.

#### KPI '②Proactive Filter supply': Basing the KPI on activities or outcomes

7.89 The supply of DTT receiver filters for self-install represents MitCo's primary mechanism for mitigating the impact of DTT interference on affected households. There are two approaches to supplying DTT receivers to affected households:

- **Proactive** supply involves the distribution of DTT receiver filters to households prior to interference occurring based on technical forecasts of interference levels and locations
- **Reactive** supply involves sending DTT receiver filters to households after interference has occurred following contact from the consumer to signal their requirement

7.90 Although the proactive supply of filters has clear benefits for DTT consumers affected by interference, the targeting limitations of current interference forecasting models

<sup>74</sup> KPI target based on average performance of a reference group of benchmark comparators operating in industries analogous to MitCo's activities

<sup>75</sup> KPI target based on the performance of a large scale UK company performing activities analogous to those likely to be undertaken by MitCo

make it difficult to identify households likely to experience interference on an individual basis. As a result, any strategy for the provision of filters proactively is likely to involve additional costs to MitCo in the form of wasted DTT receiver filters sent to households that do not require them.

- 7.91 The Government has stipulated in its consumer support decisions that DTT receiver filters should be supplied to eligible affected households on both a proactive and reactive basis. Although the precise balance between the two forms of filter provision has not been specified, the emphasis is on reducing the impact on DTT consumers from interference through mitigation prior to interference occurring where practical. If interference forecasts were accurate to the level of individual households, this would translate into 100% of affected households receiving filters proactively. However, in practice, the balance between the benefit to consumers and the significant costs of such a policy, in terms of unnecessary filters, means a lower proportion of affected households treated proactively is more efficient.
- 7.92 We propose that 90% of eligible households<sup>76</sup> affected by DTT interference should receive a filter prior to interference occurring. This represents a trade-off between benefits to consumers and the potential costs associated with the supply of filters to households who may not require them. In terms of KPIs to incentivise this outcome there are two broad approaches:
1. Setting the activities MitCo should undertake to produce the desired outcome in terms of the proportion of households affected by DTT interference receiving filters proactively; or
  2. Setting the outcome MitCo should achieve and giving MitCo discretion in what activities it considers necessary to meet the target.
- 7.93 The *first approach* would be measured by the distribution of filters proactively in specific regions and is predicated on current interference forecasting capabilities. As a result, this approach implicitly involves a level of wastage in terms of filters supplied unnecessarily, although it may be possible to reduce the level of waste by providing households with information on where to send unnecessary filters. The prescriptive nature of this approach provides little scope for MitCo to become more efficient in the targeting and distribution of filters, as in effect it is required to over-supply filters in a specific area simply to demonstrate compliance with the KPI.
- 7.94 The *second approach* is outcome based and provides MitCo with flexibility in how it chooses to meet the KPI target. This flexibility could provide scope for MitCo to achieve cost efficiencies over time through improved targeting and distribution, enabled by innovation and more precise demand forecasting.
- 7.95 The key issue with the second approach is in measuring compliance with the KPI target. Unlike the first approach, which involves records of distribution activities, an approach based on outcomes can only be measured through the absence of reactive filter requests against a forecast, on the principle that affected households who have successfully received a filter proactively will not contact MitCo to request a filter reactively.

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<sup>76</sup> Eligible households as determined by Government decisions set out in Section 3 paragraphs 3.3 to 3.10

- 7.96 To ensure the measurement of the reactive filter outcome is robust, we expect that the Supervisory Board will seek to manage the risk of under-reporting of reactive filter requests by:
- defining clear criteria as to what constitutes a legitimate reactive filter request;
  - a quarterly audit of MitCo's performance; and
  - ensuring that information materials supplied to consumers clearly outline eligibility criteria, mitigation options and the steps for requesting filters reactively.<sup>77</sup>
- 7.97 There are a number of factors that may increase the number of reactive filter requests that are not within MitCo's control, such as inaccuracies in demand estimates or potential gaming by ineligible consumers. As a result, the monitoring and verification of this KPI may require some discretion on the part of the Supervisory Board. This would occur in cases of relatively small variances from the KPI target. This discretion means that for this KPI only there may be cases where the Supervisory Board recommends that the operational condition related to a breach of the KPI be lifted early. It is important to note that the operational condition would still be expected to be automatically applied by the licensees as soon as the KPI has been breached.
- 7.98 We expect that the Supervisory Board will review MitCo's performance against the proactive KPI over time, with consideration given to consistent marginal breaches of the KPI target to prevent a 'de facto' relaxation of the KPI target.
- 7.99 We consider that on balance a KPI based on targeting the outcomes of proactive filter distribution is preferable to one that prescribes the activities MitCo carries out when proactively distributing filters. This is principally due to the scope for MitCo to improve the quality and cost efficiency of the proactive provision of filters through innovation and technological development that an outcome based target provides.
- 7.100 This benefit must be traded off against the issues associated with reporting and validation. For example there is a risk of under-reporting of reactive filter requests if consumers decide to go out and purchase their own rather than ordering them from MitCo when entitled to do so. We believe that these issues can be managed through careful oversight and judgement on the part of the Supervisory Board.

#### KPI '© Consumer complaints': Defining the KPI

- 7.101 The consumer complaints KPI represents narrowly defined complaints in relation to specific services being or not being delivered. It is necessary to draw a distinction between this and:
- *Call volumes* to MitCo to register a need for services or to request information, which represent a request for service to be met by MitCo, rather than a complaint in the sense defined under the KPIs; and
  - *Complaints in a broader sense*. We consider it likely that the Supervisory Board will wish to monitor all types of complaints on an ongoing basis and will reserve the right to advise MitCo on service improvements even if these do not represent a formal requirement under a KPI.

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<sup>77</sup> See 'additional performance management areas' for further detail

7.102 In practice, this is likely to require the definition of categories for different complaints and the capability within MitCo to reliably identify and segment different types of call. This should then allow both MitCo and the Supervisory Board to detect key trends in consumer complaints or shortfalls in service delivery.

## Operational Conditions

7.103 The effectiveness of KPIs in ensuring the correct behaviours of MitCo and 800 MHz licensees is in our view likely to be dependent on the operation of robust incentives, either in the form of rewards for good performance or more onerous conditions in the event of poor performance. As the structure of MitCo does not involve reward beyond a share of cost efficiencies, we consider 'stick' incentives linked to performance failures to be the most appropriate for managing MitCo's performance.

7.104 In the context of the aim of reducing the impact of DTT interference on consumers, in addition to providing a robust incentive on MitCo to perform well, we consider it beneficial for the incentive structure to protect consumers from the impact of MitCo's failure to meet KPIs as far as practical.

7.105 With these aims in mind, we have defined a range of principles that the incentive structure on MitCo should be designed to meet, to ensure they operate as efficiently and effectively as possible. Incentives should be:

- Responsive in their implementation to incentivise a timely response to performance failure;
- Proportional to the level to which KPIs are not met; and
- Clear and transparent around the terms and limit of their operation to give certainty to 800 MHz licensees.

7.106 Based on the principles above, we propose that the incentives on MitCo should take the form of 'Operational Conditions' which 800 MHz licensees must automatically comply with in the event that MitCo, or the individual licensees operating through MitCo, fail to meet the performance targets defined in the KPIs.

7.107 We anticipate that the Operational Conditions will apply to all licensees in circumstances where the KPIs have not been met. Although they may affect licensees in different ways because of variations between network deployments, we propose that there should be no discrimination or differentiation between licensees in how the conditions take effect. This is because we expect licensees to take collective responsibility for MitCo delivering successful outcomes – similarly, a collective failure principle will apply if underperformance occurs. Put simply, if a problem occurs in a particular location / area, we would expect the Operational Conditions to apply equally to all licensees who have 800 MHz base stations in that area.

7.108 There are three types of Operational Conditions which we suggest should be imposed on licensees where MitCo fails to meet its KPI targets. The operational conditions we propose to apply to 800 MHz licensees in the event of performance failures by MitCo are:

- **Delay base station activation:** licensees may not switch on base stations until MitCo has provided information to affected households in advance of activation. This condition is intended to ensure that no DTT interference takes place without a basic level of information and advice having been provided to consumers. This

condition is applied on a per base station basis in line with the geographical parameters defined by the information KPI. As a result, the condition is directly proportional to the scale of MitCo's performance failure.

- **Operate new base stations under test conditions:** new base stations in a given region must undergo a "testing period" prior to full switch-on, where MitCo has failed to meet the KPI targets associated with activities carried out after a base station has been activated<sup>78</sup>. This condition is intended to incentivise licensees to address the operational issues within MitCo that led to underperformance, while creating an opportunity to provide support to consumers before base stations are fully activated. This condition is applied on a main DTT transmitter coverage area basis to ensure that MitCo retains a consistent incentive to perform well in a coverage area even if it has missed its KPI target in another coverage area. The main DTT transmitter coverage areas are defined below.
- **Reduce base station power:** licensees must temporarily reduce the operating power of individual base stations in areas where MitCo has received a volume of complaints exceeding the threshold set out in its KPIs related to complaints. This condition is intended to reduce harm to DTT consumers while issues prompting complaints are addressed, by temporarily reducing interference to DTT reception in particular areas. As with the delay to base station activation, this condition is applied on a per base station basis or regionally in line with the complaints KPIs to ensure it is proportional to the scale of MitCo's failure to meet its KPIs.

7.109 Annex 6 provides further detail on these operational conditions in terms of the mechanics and parameters of their operation, including the duration of their operation, and indicate which of the above operational conditions would apply in the event of performance failure against each KPI target.

7.110 The Operational Conditions have been designed to be highly responsive to situations in which performance failure takes place. Failure to meet KPIs could result in immediate or widespread loss of consumers' DTT reception, making it imperative that the conditions take effect quickly and incentivise a timely response to remedy the interference being suffered. It is for this reason that, should one (or more) of the KPIs not be met, licensees will be required automatically to act in accordance with the requirements specified in the relevant Operational Condition.

#### Definition of geographical areas for 'Testing Conditions' operational condition

7.111 The geographical area of operation for the 'Testing Phase' operational condition needs to be defined. It must balance the requirements of ensuring the condition 'bites' as a consistent incentive whilst ensuring that the condition remains proportional to the level of MitCo's failure against KPIs.

7.112 If the area in which the Testing Phase is in force is too small, encompassing a very low number of base stations, the condition may not act as a strong enough incentive on 800 MHz licensees to ensure MitCo achieves its KPIs. If the area in which the Testing Phase is in force is too large, the effect of the condition on 800 MHz licensees' activities may be disproportionate to the initial performance failure and may undermine the incentive on MitCo to continue to achieve KPIs in a specific area.

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<sup>78</sup> See Annex 6 for details of which specific KPIs relate to which operational conditions

- 7.113 Taking into account these considerations, we propose that the Testing Phase Operational Condition should be linked to c.50 main DTT transmitter coverage areas. In addition to providing areas of operation for the Testing Phase that are sufficiently small without being overly granular, defining areas based on main DTT transmitter coverage allows the incentive to be broadly linked to DTT channels.
- 7.114 The DTT channels that consumers use to receive their TV services are a significant determinant of the likely proportion of DTT interference in a given area. Our analysis indicates that higher DTT channel coverage areas potentially experience a higher proportion of households with interference. As a result, MitCo's activities may be more intensive in higher DTT channel areas. Therefore, linking the Testing Phase to main DTT transmitter coverage areas could enable the Operational Condition to be localised to areas where it is potentially of most value in protecting consumers should MitCo fail to achieve the relevant KPIs.
- 7.115 We note that for the incentive to work efficiently and to provide clarity to 800 MHz licensees, specifically defined geographical parameters of the main DTT transmitter coverage areas will need to be defined prior to MitCo commencing operations. This will involve a degree of approximation as coverage from transmitters does not follow clean lines and coverage areas tend to overlap. We consider it likely that these coverage areas will eventually be defined on a post code basis, so as to allow MitCo to easily segment households requiring support by DTT coverage area.
- 7.116 We expect MitCo's reporting areas for KPIs associated with reactive filter supply, installation support to vulnerable and platform changes (KPIs ③, ④, and ⑤) to be aligned with these areas.

### **KPI change process**

- 7.117 We consider it necessary for Ofcom or Government (dependent on the legal mechanism through which MitCo is implemented) to retain the right, as appropriate, to modify the KPIs placed on MitCo. Principally, this is to enable Ofcom to adjust targets so as to reflect changes in performance requirements and the consumer environment over the life of MitCo's operations, as well as to manage potential uncertainty in relation to the appropriateness of KPIs set at the commencement of MitCo's activities.
- 7.118 The benefit of being able to adjust performance targets over time needs to be balanced with a need to provide certainty to the 800 MHz licensees and MitCo, in terms of the capabilities and resilience they will need to deliver performance outputs.
- 7.119 Fundamentally altering the structure of the performance framework may make the measurement of MitCo's performance problematic and could place a significant administrative burden on MitCo, in terms of evidence and reporting requirements. In addition, flexing performance targets too significantly or too frequently may undermine MitCo's service delivery arrangements with key sub-contractors, with a consequential impact on both service efficiency and quality.
- 7.120 As a result of these considerations, we propose that modifications to MitCo's KPIs be bounded within strict parameters, to give certainty to 800 MHz licensees whilst providing the body responsible for determining performance targets with an appropriate level of flexibility. We propose that:
- the scope to adjust KPIs is limited to changes to the performance *target* of the KPI rather than its structure or the service output it is applied to;

- *Only a relaxation* of the KPI's performance target should be permitted;
- Changes may be requested by MitCo no more frequently than once every 6 months.
- Changes should be based on recommendations from the Supervisory Board following engagement with the appropriate stakeholders, including 800 MHz licensees.

7.121 Limiting the scope of changes to KPIs to a relaxation of the KPI target could provide certainty to MitCo that achievement of KPIs would not be made more difficult through more stringent targets, but may require that the KPI targets set at the outset of MitCo's activities are at the upper limit of performance requirements.

7.122 The Supervisory Board may wish to undertake a review of the KPIs applied to MitCo at the end of each financial or operational year, with the aim of assessing their efficacy and applicability. It may also be beneficial, in terms of responsiveness, to allow provision for the Supervisory Board to undertake a review of KPI targets following a request by 800 MHz licensees.

7.123 We expect the substance of these reviews to be determined by the Supervisory Board and they may be largely dependent on the structures the Supervisory Board puts in place to manage its activities. Regardless of structure, we would expect the Supervisory Board to draw on inputs from a range of stakeholders and to be mindful of balancing the needs of DTT consumers with the practicality of performance thresholds for MitCo.

7.124 We consider the output of the Supervisory Board's review would be likely to be a recommendation on whether to relax MitCo's KPIs or not, and if a change is required, a recommendation on what the KPI target should be adjusted to along with evidence to support their decision. The body to which the Supervisory Board makes this recommendation is dependent on the legal mechanism through which MitCo is implemented. This body may be Ofcom or Government, but in either case, it should be at the discretion of this body to accept or reject the Supervisory Board's recommendation.

### **KPI monitoring and assurance**

7.125 To ensure that MitCo works effectively, it will be necessary for it to provide regular reports on its achievement against KPI targets to the Supervisory Board.

7.126 These performance reports should contain sufficient information to allow the Supervisory Board to monitor compliance with KPI targets, track MitCo's performance over time and determine if remedial actions or enforcement are necessary.

7.127 We propose the licensees, through MitCo, should be required to demonstrate to the Supervisory Board that they are meeting their KPI requirements. The extensive volume of data likely to be captured by MitCo as 800 MHz licensees roll out their networks is likely to necessitate an emphasis on MitCo to flag areas of non-compliance with KPIs in its performance reports to the Supervisory Board, to enable the Supervisory Board to review the appropriate response in a timely manner. MitCo's reporting requirements to the Supervisory Board will in our view need to be defined at the outset of MitCo's operations. We envisage that it may be appropriate

for this to be covered in an MoU between the Supervisory Board and MitCo, or a letter agreement between them.

- 7.128 As set out above, we consider it likely that the Supervisory Board will require an audit capability to take receipt of and review MitCo's report submissions, with a view to raising issues with the Supervisory Board as necessary. The frequency of performance reports is determined by the requirements of specific KPIs, with the shortest reporting period potentially on a fortnightly basis for information provision and consumer complaint KPIs, to allow for responsive actions in the case of failure against these KPIs.
- 7.129 To ensure that MitCo provides a true and honest view of its compliance with KPIs, we believe it may be beneficial for the Supervisory Board audit function to undertake quarterly audits of MitCo's actual performance, based on access to MitCo databases and random sampling of consumer service activities. Significant variances between reported and actual performance could then be referred to Ofcom for consideration and the possible commencement of enforcement proceedings at Ofcom's discretion.
- 7.130 The formal reporting requirements and reporting structure will be stipulated by the Supervisory Board to MitCo following the establishment of both entities. The Supervisory Board will formalise the evidential and frequency requirements of reports and information to be supplied to them during the audit process, and may include detailed instructions on the presentation and process for MitCo's reports to the Supervisory Board.

#### Geographical areas for KPI reporting

- 7.131 We propose that with the exception of KPIs where the reporting area has been specified as a radius around specific mobile base stations, the reporting area should be aligned with main DTT transmitter coverage areas (of which there are approximately 50).
- 7.132 The measurement of KPIs 3,4 and 5 is based on actual households served as reported to MitCo (e.g. through a contact centre), rather than from a modelled forecast. Therefore, the consumers related to these KPIs are not necessarily linked to a particular base station catchment, as defined in technical models. However, we believe it is still desirable to propose clearly defined reporting areas, below the national level, to allow for responsive and proportional incentives to be attached to the KPIs.
- 7.133 A description of the reporting areas is provided in the Operational Conditions sub-section at para 7.111 under the heading "Definition of geographical areas for 'Testing Conditions' operational condition"

#### **Additional performance management areas**

- 7.134 The KPIs outlined in this section represent a key element of a broader performance management framework designed to ensure MitCo provides the appropriate outcomes for eligible households experiencing DTT interference.
- 7.135 There is a range of other activities that we consider will need to be undertaken by MitCo that are unlikely to be effectively incentivised through KPIs, but which are drivers of an efficient service and a quality consumer experience which we believe will need to be monitored and assured by the Supervisory Board. These are outlined in the table below:

**Table 7.4: Additional performance management areas**

<b>MitCo activity</b>	<b>Importance</b>	<b>How monitored</b>
<b>1. Filter technical standards</b>	Provides consumers with a minimum standard of protection from DTT interference	Minimum standards agreed at outset  Supervisory Board retain right to sample and test filters supplied to consumers against the minimum standard
<b>2. Demand forecasting capability</b>	Necessary for identifying and targeting consumers proactively and validating KPI achievement	Forecast model shared between MitCo and Supervisory Board technical function  Upgrades and amendments to the model agreed by both parties on an iterative basis
<b>3. Diagnostic processes</b>	Enabler of effective and efficient consumer mitigation selection and provision	Supervisory Board review diagnostic processes and their effectiveness versus forecasts  Supervisory Board to suggest improvements as required
<b>4. Information materials / online platform</b>	Key service channels for ensuring consumers understand the interference problem and make appropriate mitigation choices	Supervisory Board to provide guidelines on the content and design of materials  Supervisory Board to approve channels prior to start of MitCo's activities and after iterative improvements
<b>5. Contact centre</b>	Key outlet for providing guidance to consumers and filter installation support to the general population	Supervisory Board to assess contact centre specific management information during quarterly audits  Supervisory Board to review telephone support processes and suggest improvements as required
<b>6. Bespoke mitigation</b>	Government has determined an expenditure ceiling of £10,000 per affected household for the restoration of TV services through bespoke mitigation	Natural cost efficiency incentive on MitCo not to exceed the limit  Supervisory Board, as part of their audit process, should review expenditure on bespoke mitigation to ensure expenditure is within the ceiling defined by Government

<p><b>7. Reporting</b></p>	<p>Key requirement to ensure MitCo provides a true and honest representation of its performance to the Supervisory Board</p>	<p>Supervisory Board to assess accuracy of reporting as part of its quarterly audit process by comparing actual performance levels with those reported</p> <p>Licence requirement on 800 MHz licensees for reported performance to have no more than a 5% negative variance from actual performance</p>
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### **Platform change cap and identifying when to provide platform changes**

- 7.136 In addition, under the consumer support policy determined by Government, it may be necessary to provide platform changes to consumers in a small number of cases where the installation of filters fails to mitigate DTT interference sufficiently.
- 7.137 Consumers will be eligible for platform changes in cases where DTT is their household's primary form of TV and where a DTT receiver filter would be ineffective at resolving the DTT interference.
- 7.138 Platform changes will be available whether the consumer has lost PSB or COM multiplex services.
- 7.139 The process by which MitCo identifies households requiring platform changes needs to be as accurate and timely as possible to mitigate the risk that MitCo either:
- inefficiently 'over-supplies' platform changes where they are not required; or
  - 'under-supplies'; or
  - is slow to identify platform change requirements causing disruption to consumers and inefficient expenditure on unnecessary mitigation efforts.
- 7.140 We envisage that the identification of households requiring platform changes is likely to be undertaken by the MitCo Contact Centre following contact with consumers, as part of its broader remit to accurately diagnose cases of DTT interference.
- 7.141 Accurately identifying platform change requirements is given additional complexity by the need to differentiate valid platform change requirements (i.e. instances where filters are ineffective) from invalid requirements, such as incorrectly installed filters, interference caused by other non-LTE related sources or consumers for whom DTT is not their primary form of TV.
- 7.142 Due to these complexities, MitCo will require a robust diagnostic function to enable contact centre staff to accurately determine requirements and eligibility for platform changes, based on independently verifiable criteria.
- 7.143 Our analysis of the latest modelling of the impact of interference indicates that requirements for platform changes are correlated with four known factors:
- Proximity to nearest base station;

- DTT channel;
- DTT signal strength; and
- Serving DTT transmitter

7.144 Approximately 95% of households affected by DTT interference are located within 1km of a base station, with 97% of interference cases occurring in DTT channels 50 and above. In addition, modelling outputs indicate areas of low DTT signal strength experience significantly greater instances of DTT interference than areas of strong DTT signal, even within the same DTT channel region.

7.145 Each of these four risk factors is independently verifiable based on data provided by new 800 MHz licensees and DTT broadcasters and can be triangulated and cross-referenced with a consumer's postcode to determine, with a reasonable degree of confidence, whether a household legitimately requires a platform change.

7.146 The Contact Centre operated by MitCo is likely to require an automated tool that consolidates and processes the data from new licensees and DTT broadcasters, alongside consumer data obtained from Contact Centre staff regarding location and eligibility, to allow the timely identification of platform change requirements. This tool is likely to use the outputs of the interference forecast model as a key input.

7.147 There may also be potential for this tool to operate through an online channel, utilising a postcode checker similar to that operated by Digital UK for Digital Switchover.

### **Platform change cap**

7.148 It is Government's intention to set an upper limit on the number of platform changes MitCo will be permitted to provide. It will not specify the cap until there is greater clarity on the scale of the problem.

7.149 A cap on the number of platform changes is desirable for a number of reasons:

- Platform changes are likely to involve significantly more disruption for consumers than fitting a filter, and so should only be undertaken if necessary. They also mean that the consumer suffers a reduction in the choice of platforms they can choose to receive their television service from. A cap is therefore desirable to limit as far as possible these consequences;
- A cap can mitigate the risk of over-supply of platform changes and the consequential impact on inter-platform competition. This could potentially come from preferential terms negotiated with another platform provider;
- A cap can act as a complement to the cost efficiency incentive on MitCo and 800 MHz licensees to optimise the trade-offs between consumer based and mobile network based mitigation.

7.150 As set out in Section 6 (para 6.28), if no network-based mitigation was undertaken, an estimated 18,000 households might be offered a platform change. If some network-based mitigation was undertaken, this number would reduce, e.g. to approximately 8,000 if network-based mitigation was applied at the 150 sites causing the greatest interference impact. This number could also be reduced if new

licensees, via MitCo, decide to offer improved DTT equipment wherever this is feasible.

- 7.151 If Government were to set a cap at, say, 20,000 platform changes, and the actual outturn number of households affected is as predicted, new licensees should be able to meet this cap simply by providing consumer-based mitigation. If Government were to set a lower cap, say 10,000, then new licensees might need to undertake some network-based mitigation in order to meet this cap.
- 7.152 We have set out for consultation two broad options to implement the Government's platform change limit.

### Hard limit option

- 7.153 A hard limit means that the platform change limit set by Government cannot be breached under any circumstances. The new licensees, working through MitCo, would need to take whatever steps they considered necessary (including, for example, mobile network-based mitigation) to ensure that the limit is not breached. Similarly, if the limit were reached, the new licensees would have to take whatever steps they considered necessary to ensure that those consumers who might otherwise still need a platform change, do not need one.
- 7.154 Alternatively, if the hard limit was breached, there could be an obligation placed on new licensees that they would pay for any further platform changes themselves. This would be outside the scope of the £180m that is being used to fund MitCo (i.e. Government would not bear this risk) and might have to be split between all new licensees on the basis of the amount of 800 MHz spectrum they held.

### Soft limit option

- 7.155 The other option is a soft limit. By this we mean that the limit might be revised upwards if the circumstances justified such an increase. We consider that Ofcom would need to make this determination.
- 7.156 In the soft limit option we would expect the new licensees, working through MitCo, to limit the number of platform changes on economic grounds – in most cases platform changes are likely to be more expensive than alternative mitigation options.
- 7.157 The 800 MHz licensees would have to seek approval from Ofcom for any increase to the platform change limit. Relevant factors for Ofcom to take into account in such a scenario might include whether or not MitCo and the new licensees had been making the most efficient choices in mitigating interference, but for some other reason (for example an initial modelling error) more platform changes were in practice needed than had been forecast. This approach might allow for more flexibility based on information on actual interference suffered at the time. However, we would not expect to consider increasing the limit more than once.
- 7.158 In the case that Ofcom declined a request to increase the cap, the new licensees would need to take whatever steps they considered necessary to ensure that no more platform changes were needed. This would be at their further cost and not MitCo's.
- 7.159 Variations on both the "hard" and "soft" options set out above are possible, and we would be interested in stakeholders' views in this regard. We would expect the Supervisory Board to assist Ofcom in arriving at any decision in relation to soft limit

increases. We would also expect to discuss the decision with Government and it might be the case that decisions on soft limit increases should in some circumstances be taken by Government rather than Ofcom.

### Provisional conclusions on options for setting cap

- 7.160 A hard limit has the benefit of reducing uncertainty in what will happen if the limit is breached. It is clear from the outset what the limit is and what will happen if it is reached. However it potentially introduces uncertainty for new licensees (depending on the level at which it is set) as they would face uncertain levels of cost related to an unknown number of additional mobile base station changes to avoid any further platform changes.
- 7.161 A soft limit could provide scope for some flexibility after the limit is set. This could avoid the risk that the hard limit carries of potentially punishing MitCo and new licensees for events outside their control (i.e. actual platform changes needed exceeding the limit originally set). However it might be challenging to determine whether or not new licensees have made reasonable and cost efficient choices over network based mitigation versus consumer based. The soft limit also introduces uncertainty for MitCo and new licensees in what will happen if it is breached.
- 7.162 We do not have a clear preference as to whether it is better to set a hard or a soft limit for platform changes. We would therefore welcome the views of stakeholders on this.

### **Managing consumer relations**

- 7.163 Our objective is to ensure that MitCo will provide a quality service to all households affected by DTT interference that are eligible for support. However, it is possible that MitCo will need to manage interactions with consumers who are dissatisfied with the service they have received.
- 7.164 If this happens we consider that MitCo should be required to do its utmost to resolve legitimate customer complaints in a timely manner and to the satisfaction of the consumer concerned. However, it will also be necessary for MitCo to have a formal dispute resolution process in place which will apply in instances where unresolved complaints escalate into disputes.
- 7.165 We recognise the likelihood that licensees may bring significant experience in managing consumer disputes to MitCo. Given this, we propose that it should be for MitCo itself to define an appropriate dispute resolution procedure.
- 7.166 However, we also recognise the distinctive conditions under which MitCo will operate, which will, for example, provide no scope for MitCo to “retain” customers by resolving disputes effectively. We therefore propose that the process defined by MitCo should require approval by the Supervisory Board before being formally adopted. MitCo must have defined and agreed such a process with the Supervisory Board within 6 months of MitCo transferring to the new licensees if MitCo is established before the auction by Government, or 6 months from the point the new licensees establish MitCo if it is established after the auction.

## Issues for consultation related to managing MitCo's performance

7.167 To ensure that the performance management regime applied to MitCo is exhaustive, robust and achievable, we would welcome responses to the questions outlined below.

*Question 7.6: Do you agree the KPIs related to MitCo's activities are appropriate and robust?*

*Question 7.7: Do you agree that the KPI for incentivising and measuring the proactive supply of DTT receiver filters to households affected by interference should be based on an assessment of the outcomes rather than the activities performed by MitCo?*

*Question 7.8: Do you agree with the approach we have outlined for incentivising KPI achievement and managing cases of non-compliance with KPIs?*

*Question 7.9: Do you agree with our proposed approach for managing MitCo's performance against other elements of service delivery that are not captured by KPIs?*

*Question 7.10: Do you think a hard or soft limit should be set in relation to platform changes? Do you have any other comments in relation to the platform change cap?*

## MitCo interaction with other parties

7.168 It is possible that MitCo will receive complaints from DTT viewers that have not been caused by LTE interference. This may include:

- Reception problems caused, for example, by equipment or installation faults, weather-related problems, transmitter maintenance or faults;
- Non-LTE interference issues caused by faulty amplifiers or boosters, nearby radio transmitters, the nearby use of electric motors etc;
- Questions or issues relating to issues such as retuning.

7.169 Additionally, existing organisations who are involved in dealing with DTT consumers may receive calls related to LTE interference. This is likely to include bodies such as the Radio & Television Investigation Service (provided by the BBC), Digital UK and broadcasters. We expect that in order to manage this, MitCo will need to interact and exchange information with these other organisations.

7.170 Interaction and the exchange of information will benefit both MitCo and DTT consumers. It will help MitCo and other organisations deal with any calls they receive that are outside of their responsibility. It will also provide consumers with better communication channels to report their issue and for their complaint to be dealt with in an efficient manner.

7.171 The approach taken to interact and exchange information will need to be determined and agreed by MitCo and the organisations involved. Any agreement is likely to include provisions as to how MitCo might share call information with other organisations. It might also need to include how information on changes to the

broadcasting network (such as maintenance work) or mobile base stations being switched on can be shared between organisations who deal with consumers.

- 7.172 We consider that the detail of any such agreements should be left to be agreed by MitCo, and that this should ideally be carried out before MitCo begins to operate.

## Managing strategic behaviour

- 7.173 One potential risk in requiring licensees to cooperate when running MitCo, and making the licensees collectively responsible for any failure on MitCo's part, is that one or more licensees could act in a way that frustrates or delays the roll-out plans of another licensee.
- 7.174 For example, if new licensees are required to work together to establish MitCo, one or more could obstruct the process and slow it down. While this would also mean that they would not be able to roll-out themselves, there may be circumstances in which this was still commercially worthwhile to a particular licensee.
- 7.175 For the same reason, it is also conceivable that a licensee could attempt to cause MitCo to fail in achieving its KPIs, thereby causing all licensees to be subject to Operational Conditions.
- 7.176 As noted earlier, we propose that the option of setting up MitCo before the auction is preferable. Following this option would mean that new licensees would take on ownership of a pre-formed MitCo shortly after the auction. After this we consider that there will be a significant role for an independent Chairperson/CEO and a Board consisting of sufficient non executive directors. This should ensure that there is a timely provision of MitCo's services in line with new licensee roll-out plans regardless of whether new licensees have different commercial objectives.
- 7.177 Alternatively if the option to set up MitCo after the auction is chosen then there is the additional risk of MitCo's establishment being frustrated. In this option Ofcom may need to consider having a role in ensuring that MitCo is established in a timely manner.
- 7.178 We also consider that the Supervisory Board is likely to play an important role in this regard as part of its monitoring function of MitCo's performance. The Supervisory Board will be tasked with advising Ofcom as to whether any directions should be given, or enforcement action taken, which could include measures taken against a specific licensee as appropriate. We consider that the combination of the factors set out above should mean that the risk of strategic behaviour by new licensees in relation to MitCo is low.

## Enforcement

- 7.179 It is our expectation that the application of the Operational Conditions (provided that they are complied with) will obviate the need for any further enforcement to ensure that the necessary interference mitigation takes place. Nonetheless, we note that if necessary, Ofcom has powers of enforcement under the Wireless Telegraphy Act 2006, which could ultimately result in variation or revocation of licences.
- 7.180 Alternatively, if the proposed obligations on MitCo/the 800 MHz licensees were to be included not in the 800 MHz licences but instead in, for example, a contract between Government and MitCo/the 800 MHz licensees, or some form of shareholders'

agreement between the owners of MitCo, contractual remedies for breach of contract may be available to secure compliance.

- 7.181 Ofcom might consider it appropriate to issue directions (as detailed further in section 8) or take enforcement action if individual 800 MHz licensees fail to, for example, comply with the Operational Conditions, triggered by MitCo underperforming against its pre-defined KPIs.

## Support for vulnerable consumers

### Providing support to vulnerable consumers

- 7.182 This section considers the issues related to who should be responsible for managing cases of DTT receiver interference experienced by vulnerable households and the potential services that could be supplied to these consumers in addition to those provided to the general population.
- 7.183 The Government has determined that vulnerable people should be entitled to additional support services to help minimise the overall disruption experienced by these consumers from DTT receiver interference. This additional support will be provided by MitCo as part of their broader obligation to mitigate the impact of DTT interference.
- 7.184 The Digital Switchover Help Scheme (DSHS) provides a useful precedent to inform both the consumer eligibility criteria and consumer support options for vulnerable consumers, due to the similarities faced by vulnerable consumers during Digital Switchover (DSO) and those experiencing DTT interference. For DSO, the main concerns were that vulnerable consumers might struggle to read and understand the information provided and take the necessary actions to maintain their access to TV services, including connecting new digital equipment.

### Eligibility for additional support

- 7.185 In light of the similarities in service provision, Government has determined that when identifying those affected households eligible for additional support, MitCo should use the eligibility criteria defined by the DSHS under digital switchover. This would mean that consumers experiencing DTT interference caused by LTE would be entitled to additional support if they:
- Are aged 75 or over;
  - Are eligible for any of the following: Disability Living Allowance; Attendance Allowance; Constant Attendance Allowance; or Mobility Supplement;
  - Are registered blind or partially sighted; or
  - Have lived in a care home for six months or more.
- 7.186 This would be achieved by providing eligible consumers with sufficient information to enable them to signal their requirements through direct contact with MitCo. They would effectively apply for the vulnerable support and as long as they met any of the criteria would receive the support.

## **Level of additional support**

- 7.187 The level of general consumer support determined by Government includes the supply of information, the distribution of filters and platform changes for those households where filters are not effective.
- 7.188 Although it may be possible to structure the content and distribution of the general information campaign to satisfy the requirements of vulnerable people, it may also be desirable to include additional information services for these consumers.
- 7.189 The additional information campaign could include materials developed specifically for vulnerable consumers and advertising via publications aimed at people who may be eligible for targeted help<sup>79</sup>. The campaign may also involve engagement with voluntary groups for information support to target the hardest to reach vulnerable consumers. In this regard, there may be potential to leverage the lessons learned and capabilities developed as part of the DSO 'Community Outreach Programme.'
- 7.190 An installation support service would be offered to eligible vulnerable consumers who require it. This service is likely to involve pre-booked visits by trained and approved DTT receiver filter installers to households with vulnerable people to install filters and verify interference mitigation. The filter installation will be followed by after-care services, including check-up calls from the contact centre and further installer visits if required.
- 7.191 If platform changes are required for eligible vulnerable households, these households could be identified and flagged with the platform provider to ensure they are mindful of the specific requirements of these consumers. There might also be the need for a follow up visit by MitCo to assist vulnerable consumers in using their new equipment.

## **Managing performance for vulnerable support**

- 7.192 We propose that appropriate standards of service delivery to eligible vulnerable households should be managed and incentivised through the MitCo KPI regime and assurance of processes by the Supervisory Board.
- 7.193 A specific KPI (KPI 4) relates to the timeliness of installation support services supplied to vulnerable households and the rate of 'first time fixes' by DTT receiver filter installers to minimise the disruption experienced by vulnerable consumers.
- 7.194 The Supervisory Board, in addition to its role of validating compliance against KPI targets, would review and approve the information materials to be targeted at vulnerable consumers and assess MitCo's installation service processes.
- 7.195 It may also be beneficial for the Supervisory Board to stipulate specific requirements on the DTT receiver installer field force, including a requirement that all installers are suitably qualified and have received adequate disability and age awareness training.

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<sup>79</sup>As per 'Supporting Vulnerable Consumers with targeted assistance at and after Digital TV switchover', Consumer Expert Group for DCMS, 2006

## Closure arrangements for MitCo

7.196 In this sub-section we consider issues related to the closure of MitCo. The arrangements we intend to put in place to manage MitCo's closure fall into two categories, which are described in more detail below:

- Arrangements relating to the timing and features of MitCo's closure;
- Arrangements for dealing with interference that occurs after MitCo closes.

### Timing of closure

7.197 Our proposals for the timing of MitCo's closure are informed by policy decisions taken by Government. Government has decided that MitCo should continue to operate for one year after the completion of network roll-out and should have a back-stop closure date of 2017. Government has also indicated that it expects these dates to be kept under review by the Supervisory Board.

7.198 On the basis of these decisions, we propose that MitCo will close no later than the end of 2017, but that licensees will have the opportunity to request that MitCo closes earlier if they can make a clear case for doing so. This request would have to be made unanimously by licensees to the Supervisory Board, with the final decision over bringing forward the closure date resting with Ofcom.

7.199 In the event that MitCo's closure date is brought forward, it would still be incumbent on licensees to operate MitCo for 12 months after the completion of network roll-out, unless a shorter period was agreed with the Supervisory Board and Ofcom. This would mean that, in effect, MitCo's closure date could only be brought forward if licensees were able to demonstrate that their networks could be considered "complete" before the end of 2016. We would expect MitCo to spend the period after network completion providing further consumer support and making arrangements for closure.

### Features of closure

7.200 MitCo's closure will involve various events affecting licensees, Government and others. We expect each of the following to be features of the closedown:

- **Operation of gain share mechanism:** the gain share mechanism will take effect when MitCo is closed down, with any underspend from MitCo's £180m budget being allocated in 50:50 shares between licensees and Government as set out above.
- **Government audit:** Government will have the right to independently audit MitCo to ensure the gain share is properly calculated.
- **Disbanding the Supervisory Board:** the Supervisory Board will be disbanded around the same time that MitCo is closed.
- **Ownership of MitCo:** licensees' ownership of MitCo will cease when they claim their share of MitCo's remaining assets (i.e. any budget underspend); MitCo will effectively be dissolved once these assets have been reallocated.
- **Intellectual property (IP):** at its point of closure MitCo will hold various IP rights. We propose that ownership of certain elements of this IP, specifically the MitCo

brand and the parameters of MitCo's technical modelling capability, will pass to Government when MitCo closes.

### **Dealing with interference after MitCo closes**

7.201 Although we expect the vast majority of interference to DTT to be mitigated during MitCo's lifetime, we recognise that interference may not end completely with MitCo's closure. Further interference could be caused, for example, if licensees raise operating power at certain sites or activate new base stations after MitCo has closed.

#### Requirements on licensees

7.202 To take account of this potential for further interference, we propose to place certain requirements on licensees and MitCo. These are:

- A requirement on MitCo to provide Ofcom with a register of base stations that have had any changes applied to them to assist with protection of DTT;
- A condition in 800 MHz licences allowing Ofcom to incorporate this information on network-based mitigation into the licences as a binding condition, with licensees having the option of applying for this step to be reversed;
- A requirement for licensees to supply Ofcom with information on any new base stations built or power increases at existing sites for five years from the date of MitCo's closure.

7.203 Further details of these requirements can be found in Section 8.

#### Future consumer support

7.204 After MitCo closes, 800 MHz licensees will face no liability for providing further consumer support, other than through the licence conditions outlined above. If further support is deemed necessary because of ongoing interference it will be for Government to decide how this should be provided.

*Question 7.11: Do you agree with the requirements we propose to place on licensees to address interference after MitCo closes?*

## Section 8

# Requirements on new licensees

## Introduction

- 8.1 We have set out in Section 7 our views on how we consider that the interference into DTT that will be caused by use of the 800 MHz spectrum should best be mitigated, in light of the decisions that Government has already taken in this regard (such as, for example, that such mitigation should be carried out by a mitigation body run by the new 800 MHz licensees). As we set out in that section, there are a number of ways in which such mitigation could be achieved.
- 8.2 The precise means of ensuring that the Government's policies in this regard are achieved will depend in part on decisions to be taken in light of stakeholders' views on the matters set out in Section 7. We have therefore set out below a summary of the broad types of requirements, as described in Section 7, that we currently consider are likely to be needed to implement the options set out in Section 7, subject to consultation responses and the decisions finally taken.
- 8.3 We have made no decisions as to the precise form that any of these requirements might take (for example whether they should be included as licence conditions in the 800 MHz licences, in co-ordination procedures notified under such licences, or in contractual arrangements as between different parties etc).
- 8.4 We have summarised the types of requirements along the lines of the three phases of MitCo's operation that we set out in Section 7:
- 8.4.1 Requirements relating to the establishment, management and interaction between the mitigation bodies (namely MitCo and the Supervisory Board), including funding;
  - 8.4.2 Requirements relating to the day-to-day mitigation of interference suffered or likely to be suffered by DTT consumers including the Key Performance Indicators that we expect MitCo is likely to be required to meet;
  - 8.4.3 Requirements relating to the closure of MitCo and ongoing mitigation of interference thereafter.
- 8.5 The policy reasons explaining why we consider that these types of requirements are likely to be necessary are set out in Section 7 and are not repeated here.

## Establishment, management, and funding of mitigation bodies, and interaction between them

### (a) Ownership, governance and participation in MitCo

- 8.6 We envisage that the following types of requirements are likely to be necessary in relation to the ownership, governance and participation in MitCo, specifically, requirements on the 800 MHz licensees to:
- 8.6.1 set up MitCo (but only in the event that Government decides not to set up MitCo itself);

- 8.6.2 become joint owners of the mitigation body, in proportion to their 800 MHz spectrum holdings;
- 8.6.3 nominate one or more representatives to be appointed on their behalf to the management of MitCo;
- 8.6.4 participate in the day-to-day governance and operation of MitCo, insofar as being responsible, jointly with the other licensees who have been awarded spectrum in the 800 MHz auction, for the decisions, activities and liabilities of MitCo;
- 8.6.5 co-ordinate with the other 800 MHz licensees to ensure compliance with all of the obligations on each of them relating to the effective mitigation of interference into DTT.

(b) Funding and gainshare mechanism

- 8.7 We envisage that the following types of requirements are likely to be necessary in relation to the funding of MitCo, specifically requirements on the 800 MHz licensees to:
  - 8.7.1 pay a specified amount into a specified account, no later than by a specific date and time, for the purposes of funding MitCo and the Supervisory Board (in the event that Government decides that funding is not be provided directly from HM Treasury);
  - 8.7.2 on the dissolution of MitCo, account for 50% of any of the remaining funds in MitCo to Government, by paying that amount into a bank account notified to them by Ofcom or Government, and should Ofcom or Government consider it appropriate, submit to an audit with respect to those amounts;
  - 8.7.3 split the remaining 50% of funds in MitCo as between each of the 800 MHz licensees in proportions to be determined.

(c) Provision of information

- 8.8 We envisage that the following types of requirements are likely to be necessary to ensure that MitCo and the Supervisory Board have the information needed to perform their functions, specifically requirements on each 800 MHz licensee to:
  - 8.8.1 provide to MitCo, the Supervisory Board and to Ofcom in such manner and at such times as MitCo, the Supervisory Board or Ofcom may reasonably require, such documents, accounts, returns, estimates, reports, notices or other information as:
    - a) MitCo or the Supervisory Board may require for the purposes of taking steps to mitigate interference, or to make recommendations with respect to such steps being taken; or
    - b) Ofcom may require for the purpose of carrying out any of its statutory functions in this regard;
  - 8.8.2 provide MitCo and Ofcom with information as to:
    - a) existing and planned network deployment;

- b) base station details, including the power levels at which it intends to transmit;
- c) any other information that MitCo, the Supervisory Board or Ofcom may reasonably require for the purposes of co-ordinating the necessary measures to avoid undue interference to DTT consumers in adjacent spectrum bands.

(d) Co-operation with MitCo and the Supervisory Board

8.9 Requirements for each 800 MHz licensee to:

- 8.9.1 co-operate with MitCo and, in particular, comply, in a timely manner, with any request reasonably given to it by MitCo.
- 8.9.2 co-operate with the Supervisory Board and, in particular:
  - (a) comply, in a timely manner, with any recommendations reasonably given to the Licensee by the Supervisory Board for the purposes of mitigating interference to DTT consumers in adjacent spectrum bands;
  - (b) attend meetings and participate in any committees organised or convened by the Supervisory Board for the purposes of mitigating interference to DTT consumers in adjacent spectrum bands;
  - (c) submit to an audit by the Supervisory Board of their performance, through MitCo, against the KPIs at such times as the Supervisory Board reasonably considers appropriate.

## **Day-to-day mitigation of interference**

8.10 We envisage that the following types of requirements are likely to be necessary to ensure the effective mitigation of interference into DTT. They fall into the following broad areas:

- 8.10.1 The provision of information to DTT consumers;
- 8.10.2 The provision of filters to DTT consumers and carrying out platform changes;
- 8.10.3 Meeting KPIs in relation to the above;
- 8.10.4 Co-operating with MitCo and the Supervisory Board;
- 8.10.5 Compliance with directions given by Ofcom.

(a) Provision of information to DTT consumers

8.11 Requirements on each 800 MHz licensee, through MitCo, to:

- 8.11.1 prior to commencement of service provision using the 800 MHz band in a particular area, inform members of the public that DTT consumers who are receiving television services in that area may experience interference with those services;

- 8.11.2 provide information to consumers (including on the internet) that assistance is available to DTT consumers who are receiving DTT services and who are experiencing interference to those services;
- 8.11.3 ensure that a “Contact Centre” is established for the purposes of assisting DTT consumers by (for example, but not limited to) diagnosing interference, determining the cause of such interference, and scheduling any such further support as may be appropriate to provide to those individuals;
- 8.11.4 provide an effective complaints handling procedure to resolve complaints brought by consumers in relation to the carrying out of MitCo’s functions to mitigate DTT interference.

(b) Provision of filters to DTT consumers and carrying out platform changes

- 8.12 Requirements on each 800 MHz licensee, through MitCo:
  - 8.12.1 to send filters to certain households who are within a given radius of a base station in advance of base station activation;
  - 8.12.2 to send a filter to individual households in other circumstances, for example where a member of the public notifies MitCo that he or she is experiencing interference to his or her DTT service, provided that:
    - a) that household receives television services solely through the DTT platform and does not rely solely on a set-top aerial; and
    - b) a filter has not already been provided to that household.
  - 8.12.3 to make arrangements for a trained technician to install filters for vulnerable consumers;
  - 8.12.4 to make arrangements to install an alternative, but equivalent, television platform (for example, satellite or cable) where a filter has been sent to a household but that filter (either alone, or in combination with any network-based mitigation that the licensee has itself decided to adopt) has failed to prevent the loss of reception by that household of services provided by one or more PSB or commercial multiplexes received by that household and if an alternative television platform is not available pursue other ways of returning the TV services to the consumer but only where the cost of doing so in respect of any one household would not exceed a given monetary limit (£10,000);
  - 8.12.5 to ensure that the number of platform changes provided does not exceed a given number nationally;
  - 8.12.6 to report on a monthly basis to the Supervisory Board as to the number of platform changes that have been made in that month and the total of platform changes that have been made as at that reporting date.

(c) Meeting KPIs

- 8.13 As set out in Section 7 we consider that it will be important to set out detailed KPIs which the 800 MHz licensees, through MitCo, will be required to meet in order to

ensure that interference into DTT is appropriately mitigated. We have set out in Annex 6 the detail of the KPIs that we propose should apply in this context.

- 8.14 As set out in Annex 6, we propose to structure each of the KPIs in three parts:
- 8.14.1 a “Standard” setting out the specific details of what is to be achieved by the KPI;
  - 8.14.2 specific “Reporting Requirements” in relation to each KPI; and
  - 8.14.3 an “Operational Condition” that will automatically apply in relation to each KPI, should the licensee fail to meet the specified Standard.
- 8.15 We consider that the following types of requirements should apply in this regard to each 800MHz licensee, requiring them through MitCo:
- 8.15.1 to act in a manner best calculated to meet the KPIs which apply in relation to the obligations to secure appropriate mitigation of interference;
  - 8.15.2 report on a regular basis to the Supervisory Board on its performance against the KPIs (as set out in further detail in the KPIs);
  - 8.15.3 apply and act in accordance with the Operational Conditions set out in the KPIs where the licensee has failed to meet the Standard KPI.

(d) Compliance with directions given by Ofcom

- 8.16 In certain circumstances (which we would envisage would generally be likely to be exceptional) it might be necessary for Ofcom to direct that certain action should be taken to secure effective mitigation of interference into DTT. We envisage that such directions might require the 800 MHz licensees to:
- (a) reduce, to a specified limit, the power level at which a base station (or base stations) within a network is transmitting, for a specified time, or until such time as Ofcom may otherwise direct;
  - (b) stop, slow down, or delay the deployment of base-stations for a specified period of time, or until such time as Ofcom may otherwise direct;
  - (c) stop or delay the switching on a base station for a specified period of time, or until such time as Ofcom may otherwise direct;
  - (d) require individual base stations to be re-sited to alternative locations where they are likely to minimise the interference caused to other users of the electro-magnetic spectrum in adjacent spectrum bands.

## **Closure of MitCo and management of ongoing interference**

- 8.17 Requirements on each 800 MHz licensee:
- 8.17.1 to continue to participate in MitCo until either 2017, or such time as otherwise notified by Ofcom;

- 8.17.2 to take such steps as Ofcom may direct in connection with the dissolution of MitCo;
- 8.17.3 to submit to an audit of MitCo undertaken on behalf of Government or Ofcom, as notified by Ofcom;
- 8.17.4 to deliver up to Ofcom or Government any intellectual property belonging to Government, such as (but not limited to) any branding of MitCo.
- 8.17.5 following the dissolution of Mitco:
  - (a) to provide Ofcom with an up-to-date register of all its base stations as at the time of the dissolution of MitCo, and to include in that register details of any changes that may have been made to those base stations since they were first deployed;
  - (b) continue to operate at transmission levels that are no higher than it was operating at, as at the time of MitCo's dissolution, unless otherwise agreed with Ofcom;
  - (c) to inform Ofcom of any changes it is making to its network (including, but not limited to, the deployment of any further base-stations) for a period of five years, commencing from the date of MitCo's closure.

*Question 8.1: Do you have any views on the nature or detail of the requirements we propose may be necessary as set out in this Section?*

## Annex 1

# Responding to this consultation

## How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on Thursday 19<sup>th</sup> April 2012**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://stakeholders.ofcom.org.uk/consultations/second-coexistence-consultation/howtorespond/form> as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email [Coexistence@ofcom.org.uk](mailto:Coexistence@ofcom.org.uk) attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation.
- Reuben Braddock  
Floor 3  
Spectrum Policy Group  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

## Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Reuben Braddock on 020 7981 3108.

## Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk), ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether

all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

## Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in the summer.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: [http://www.ofcom.org.uk/static/subscribe/select\\_list.htm](http://www.ofcom.org.uk/static/subscribe/select_list.htm)

## Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk) . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, Secretary to the Corporation, who is Ofcom's consultation champion:

Graham Howell  
Ofcom  
Riverside House  
2a Southwark Bridge Road  
London SE1 9HA

Tel: 020 7981 3601

Email [Graham.Howell@ofcom.org.uk](mailto:Graham.Howell@ofcom.org.uk)

## Annex 2

# Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

### Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

### During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

### After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

## Annex 3

# Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk).
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at [www.ofcom.org.uk/consult/](http://www.ofcom.org.uk/consult/).
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

## Cover sheet for response to an Ofcom consultation

### BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing  Name/contact details/job title

Whole response  Organisation

Part of the response  If there is no separate annex, which parts?

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

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Name

Signed (if hard copy)

## Annex 4

# Consultation questions

- A4.1 We are inviting responses to the following questions set out throughout the sections of this consultation and welcome views from stakeholders on any aspect of DTT coexistence which they would like to raise with us.

*Question 7.1: Do you agree that it is best to seek to establish MitCo in advance of the auction for later transferral to 800 MHz licensees?*

*Question 7.2: Do you agree with our initial views on MitCo's constitution and governance?*

*Question 7.3: Do you have any views on the proposed approach to the Supervisory Board.*

*Question 7.4: We propose that the 50% gain share be split between 800 MHz licensees based on the volume of spectrum they hold in the 800 MHz band. Do you have any comments on this proposal?*

*Question 7.5: Are the information parameters defined above and in Annex 5 sufficient to allow MitCo to accurately and reliably forecast the scale and scope of households affected by DTT interference?*

*Question 7.6: Do you agree the KPIs related to MitCo's activities are appropriate and robust?*

*Question 7.7: Do you agree that the KPI for incentivising and measuring the proactive supply of DTT receiver filters to households affected by interference should be based on an assessment of the outcomes rather than the activities performed by MitCo?*

*Question 7.8: Do you agree with the approach we have outlined for incentivising KPI achievement and managing cases of non-compliance with KPIs?*

*Question 7.9: Do you agree with our proposed approach for managing MitCo's performance against other elements of service delivery that are not captured by KPIs?*

*Question 7.10: Do you think a hard or soft limit should be set in relation to platform changes? Do you have any other comments in relation to the platform change cap?*

*Question 7.11: Do you agree with the requirements we propose to place on licensees to address interference after MitCo closes?*

*Question 8.1: Do you have any views on the nature or detail of the requirements we propose may be necessary as set out in this Section?*

## Annex 5

# Information for interference forecasting

A5.1 This annex presents the full range of information we consider necessary for the operation of an effective interference forecasting capability.

### Mobile network data

A5.2 For each base station in the network the following data is required:

- Location (grid reference)
- Site height above sea level (m)
- Antenna height above ground level (m)
- Number of cell sectors
- Carrier frequency for each sector
- Bandwidth for each sector
- In-block EIRP for each sector
- Horizontal and vertical radiation pattern for each sector
- Polarisation for each sector
- Switch-on date

A5.3 It is assumed that licensees will be able to provide this data to MitCo, with regular updates as their roll-out plans progress. Information on out-of-band emission levels would be beneficial, but we are aware that this may be proprietary information or difficult to obtain. If this data is unobtainable, default values for the out-of-band emission levels could be used instead.

### Broadcast network data

A5.4 For each 100m x 100m pixel in the UK the following data is required:

- Location of pixel (grid reference)
- Number of household within the pixel (households)
- Appropriate PSA (preferred service area) data for all relevant layers
- DTT coverage per MUX (% locations)

- Wanted DTT signal strength (50% time median and standard deviation) per MUX<sup>80</sup>
- Unwanted (self-interference) DTT signal strength (1% time median and standard deviation)<sup>81</sup>
- Clutter data relevant to DTT propagation<sup>82</sup>

### Other parameters

#### A5.5 Other data:

- Number of communal dwellings (providing a proxy for CAS installations) per pixel, e.g. derived from UK Census data.
- Detailed address database, e.g. Royal Mail Address Point.

#### A5.6 The following 'real-world' parameters are also required:

- DTT receiver performance, as described via LTE-to-DTT protection ratios. These should be based on up-to-date measurements of DTT receivers and modified to reflect DTT receiver market statistics.
- Propagation model for interference from LTE to DTT, including median and standard deviation of path loss in different clutter environments.

A5.7 Initially, the protection ratios and propagation models will need to be specified by Ofcom in order to calculate the baseline interference prediction against which MitCo's KPIs are set. Subsequently, there will be scope for MitCo to vary these parameters in response to field experience so that the model is as accurate as possible.

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<sup>80</sup> This would enable MitCo to make more accurate predictions and to compare the model versus field experience. It could also be useful for the accurate targeting of platform changes.

<sup>81</sup> *Ibid.*

<sup>82</sup> The same clutter data could be used for LTE interference calculations.

## Annex 6

# Proposed KPIs

A6.1 This annex presents our detailed proposals for the KPIs against which MitCo's performance would be measured. This information includes the KPIs themselves, the specific performance reporting requirements on MitCo and the operational conditions that would take effect in the event of performance failure.

### Part A: KPIs Prior to Base Station Switch On (Standards, Reporting Requirements and Operational Conditions)

Standard	Reporting Requirement(s)	Operational Condition(s)
<p><b><u>KPI 1</u></b></p> <p>1(1).The licensee must ensure that, prior to switching on a base station, 99.9% of households forecast to experience interference to their reception of DTT services within a 2 km radius of that base station are sent information at least one calendar month, and no earlier than three calendar months, in advance of the date on which that switch on is planned</p>	<p>1(2)The licensee must report its progress against this Standard to the Supervisory Board at two weekly intervals during the three calendar month period immediately prior to the date on which the licensee intends to switch on its base station.</p>	<p>1(3) The licensee must, in the event that it has not complied with the Standard set down in this KPI by the date on which it intends to switch on its base station, delay switch on of that base station until such time as it can satisfy the Supervisory Board that that Standard has been met.</p>

### Part B: KPIs After Base Station Switch On (Standards, Requirements and Operational Conditions)

Standard	Reporting Requirement(s)	Operational Conditions
<p><b><u>KPI 2</u></b></p> <p>2(1) The licensee must ensure that no more than 10% of households forecast to experience interference to their reception of DTT services within a 1.5 km radius of that base station should request that a filter be sent to them within one calendar month following the activation of a base station.</p>	<p>2(2) The licensee must report to the Supervisory Board, four weeks after the switch on of a base station:</p> <p>(a) the number of requests that it has received from households seeking a filter;</p> <p>(b) the number of households that it forecast might experience interference to their DTT services; and</p> <p>(c) the number reported under (a) expressed as a percentage of the number reported under</p>	<p>2(3) The licensee must, in the event that it has not complied with the Standards of this KPI:</p> <p>(a) undertake a "testing phase" before switching on any further base stations in the same DTT transmitter region<sup>83</sup>, whereby the licensee must:</p> <p>(i) four weeks prior to the date on which it intends to switch on a further base station permanently, ensure that members of the public who are within an 1.5 km radius of that base station are informed in</p>

<sup>83</sup> The "DTT transmitter region" is discussed in the Operational Conditions sub-section at para 7.111 under the heading "Definition of geographical areas for 'Testing Conditions' operational condition"

	<p>(b).</p> <p>(d) whether or not, in its view, it has met the Standard specified for this KPI.</p>	<p>writing that the licensee will be commencing a “testing phase” and the date, time, duration and purpose of the test;</p> <p>(ii) where it provides information under (i), ensure that such information also includes contact details for itself, and for the Contact Centre, and make it clear to members of the public that, should they experience interference to their DTT equipment during the “testing phase”, they may contact either the licensee or the Contact Centre and report such interference;</p> <p>(ii) switch on the further base station at the transmission limit of 64dBm for a period of fifteen minutes, commencing at a time chosen by the licensee during the hours of 7am – 6pm.</p> <p>(b) commence the “testing phase” from the date on which it reports to the Supervisory Board that it has not met the Standard for this KPI, and continue to operate the “testing phase” for each further base station for a period of one month, from the date on which the failure was reported to the Supervisory Board, or until the next time that the licensee is due to report to the Supervisory Board again, whichever is longer.</p>
<p><b><u>KPI 3</u></b></p> <p>3(1)The Licensee must ensure that:</p> <p>(a) where a filter has been sent to a household that is forecast to, or is, experiencing interference to its DTT services:</p> <p>(i) at least 91% of filters are delivered to the household within two working days of the household notifying either the Licensee or the Contact Centre of the interference;</p> <p>(ii) at least 98% of filters are delivered to the household</p>	<p>3(2)The Licensee must report to the Supervisory Board at the end of each calendar month as to:</p> <p>(a) the number of instances that month where a household has notified it, or the Contact Centre, that that household is experiencing (or has experienced) interference during the course of that calendar month, with reference to the relevant main DTT transmitter coverage area;</p> <p>(b) in relation to each</p>	<p>3(3) As set out under KPI 2(3) above.</p>

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<p>within four working days of the household notifying either the Licensee or the Contact Centre of the interference; and</p> <p>(iii) at least 99.9% of filters are delivered to the household within five working days of the household notifying either the Licensee or the Contact Centre of the interference</p>	<p>notification received under (a), the time period in which that household was sent a filter, relative to the date on which the notification was made;</p> <p>(c) the percentage of filters that were sent:</p> <p>(i) within two working days;</p> <p>(ii) within four working days; and</p> <p>(iii) within five working days.</p>	
<p><b><u>KPI 4</u></b></p> <p>4(1) The Licensee must ensure that, where it is arranging for households to have a platform change, 99.9% of such changes are completed within eight working days from the date on which the Licensee has been notified itself, or been advised by the Contact Centre, that such a platform change is required.</p>	<p>4(2)The Licensee must report to the Supervisory Board each calendar month as to:</p> <p>(a) the number of instances that month where a household has requested a platform change, with reference to the relevant main DTT transmitter coverage area;</p> <p>(b) the date on which the request was made;</p> <p>(c) the date on which the platform change was made; and</p> <p>(d) the percentage of households for which the platform change was completed within eight working days from the date on which that vulnerable consumer made such requests.</p>	<p>4(3) As set out under KPI 2(3) above.</p>
<p><b><u>KPI 5</u></b></p> <p>5(1) The Licensee must ensure that, where it is arranging the installation of filters for vulnerable consumers:</p> <p>(a) 99.9% of such installations are completed within eight working days from the date on which the Licensee has been notified itself, or been advised by the Contact Centre that such an installation is required; and</p> <p>(b) 98% of such installations are completed on the first visit by the trained technician.</p>	<p>5(2)The Licensee must report to the Supervisory Board each calendar month as to:</p> <p>(a) the number of instances that month where a vulnerable consumer has requested the installation of a filter, with reference to the relevant main DTT transmitter coverage area;</p> <p>(b) the date on which the request was made;</p> <p>(c) the date on which the filter was installed;</p> <p>(d) the percentage of vulnerable</p>	<p>5(3) As set out under KPI 2(3) above.</p>

	<p>consumers for whom the filter installation was completed within eight working days from the date on which that vulnerable consumer made such requests; and</p> <p>(e) the number of visits that a trained technician was required to make in order to successfully install a filter.</p>	
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### Part C: KPIs Relating to Complaints (Standards, Requirements and Operational Conditions)

Standard	Reporting Requirements	Operational Conditions
<p><b><u>KPI 6</u></b></p> <p>6(1) The Licensee must ensure that it has put in place adequate arrangements with regard to the provision of information, filters and platform changes, such that no more than:</p> <p>(a) 5% of households who are entitled to request a filter, and have done so, complain, either to the Licensee or to the Contact Centre, that they have not received a filter within five working days of making the request;</p> <p>(b) 5% of vulnerable consumers who have requested the installation of a filter complain that either:</p> <p>(c) they have not received the installation of a filter within nine working days of making the request.</p>	<p>6(2) The Licensee must report to the Supervisory Board every two calendar weeks as to:</p> <p>(a) the number and nature of the complaints that have been made over that two week period;</p> <p>(b) the number of those complaints as a percentage of the total number of households that are potentially within the scope of KPI 6(1)(a)-(c).</p>	<p>6(3) The Licensee must, in the event that it has not complied with the Standard of this KPI for the month in which it is reporting:</p> <p>(a) reduce its in-block transmission level by 6 dB until such time as the Supervisory Board is satisfied that the Licensee is able, for the time being, to meet the required Standard.</p> <p>(b) provide, or arrange to be provided, a written apology to each vulnerable consumer who has had to wait longer than eight working days before a trained technician first attended their house to install a filter or make a platform change or who has had to have more than one visit from a trained technician in order to have a filter installed or platform change made.</p>