



Digital UK's Response to the Ofcom Consultation

**'Coexistence of new services
in the 800 MHz band with DTT'**

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Executive Summary

Digital UK is the not-for-profit organisation managing the UK's Digital TV Switchover Programme and Channels 61/62 Clearance Project. We are pleased to have the opportunity to respond to Ofcom's consultation on '*Coexistence of new services in the 800MHz band with Digital Terrestrial TV*'.

TV switchover is the process by which DTT will be extended to reach 98.5% of UK homes – matching analogue terrestrial coverage before switchover. It has been Government policy since 1999 that switchover would only proceed if “everyone who could receive the main analogue services was able to receive the digital equivalents of those services” and that this would be “best achieved by ensuring that DTT coverage at switchover substantially matches that of analogue. In practical terms, this means ensuring that DTT coverage is available to 98.5% of UK households”¹. While there are small numbers who cannot get DTT after switchover, this principle of ‘universality’ is a fundamental tenet and the key consumer benefit of the switchover programme, which will bring Freeview services to more than 7 million UK homes for the first time. As a result, Ofcom estimates that 1.3 million homes have invested in Freeview equipment since switchover began in 2008, taking the total number of homes currently using DTT to 19 million (74% of all UK homes)².

We hope that our understanding of the DTT consumer and their journey through switchover, clearance and LTE interference; as well as our technical expertise in areas such as DTT equipment, aerial installations, and communal systems gained through switchover, will assist Ofcom and all stakeholders develop an appropriate response to support those DTT viewers affected by interference from LTE mobile services in the future.

Our responses to the five questions posed by the consultation are summarised below.

1. Assessment of the Numbers of Households Affected

While the consultation document attempts to analyse the *scale* of the interference effect, we feel it does not go far enough in assessing the *consumer impact* of the interference. This will be determined by factors such as the timing of the loss of DTT services (including in relation to switchover and clearance); the severity of that loss (whether it is picture degradation or total loss of service); and on which channels (and how many channels) the loss occurs.

Understanding the impact of the interference on consumers will be extremely important to gauge the appropriate mitigations. We hope that in the follow-on consultation Ofcom might be able to provide some further detail on where, when, and how the interference will manifest itself; and which channels will be affected.

With regards to the assessment of the scale of the losses, we feel that Ofcom's numbers are likely to be too low since some assumptions have been set lower than may be the case in reality (e.g. assumptions about LTE base station power, or the assumption that LTE base stations will also be co-sited), and some elements are missing from the analysis (e.g. the impact on set-top aerials).

We also note that multiple assumptions have been layered on top of one another without any assessment of the possible distribution of real-world outcomes around those assumptions.

We suggest that Ofcom re-cast its numbers to provide a range of possible outcomes, and a sensitivity analysis to explain which assumptions are driving the scale of the predicted interference. In view of the need to complete this work and make the results available to all it is strongly recommended that Ofcom hold a follow-on consultation.

¹ Source: Government Response to the Culture, Media and Sport Select Committee, Session 2005-2006: Report on Analogue Switch-Off [http://www.digitaltelevision.gov.uk/pdf_documents/publications/2006/Cm6850_govtresponse.pdf]

² Source: Ofcom Digital TV Progress Reports

2. Assessment of the Mitigation Options

Ofcom discusses a number of mitigation techniques in its consultation, and we broadly agree with the techniques identified, and Ofcom's assessment of the technical efficacy of them.

However we are concerned that too much weight has been given to *technical efficacy*, and not enough weight to the *consumer impact*, and in particular the considerable consumer disruption that would be generated by what appears to be the favoured option: installation of small DTT filter devices behind the television set in the home. We believe that both factors should be taken into account when assessing the desirability of the different mitigation options.

We believe that it is extremely important that Ofcom differentiates those mitigation options that are *network-based* (i.e. minimise the impact on consumers) from those that are *consumer-based* (e.g. installation of DTT filters in the home), and ranks the available mitigations in the order with which they should be applied, with network-based mitigations generally being considered before reaching consumer-based mitigations.

The aim must be to prevent interference to consumers' DTT services in the first place wherever possible, not simply taking steps to restore DTT reception after it has been lost.

We suggest that Ofcom needs to do further work to understand the consumer impact of any consumer-based mitigations (for example, testing the usability of DTT filters and consumers ability to install them), and should quantify the consumer impact (what it terms 'non-cash costs') and take this more fully into account in its analysis.

We also believe that Ofcom should consider the long term impact on the strength of the DTT platform – a platform that both consumers and broadcasters have invested in for switchover – in light of this disruption to DTT services.

3. The Level of Consumer Support

Without a fuller assessment of the consumer impact of the LTE interference, and the consumer impact of the various mitigations, we find it difficult to gauge the appropriate level of consumer support, or how it should be delivered.

This aside, we agree that it is very probable that managing the impact of LTE interference on the DTT consumer will require information and advice to be available. This should be available reactively via a contact centre and website, but will also need to be advertised proactively in areas where a significant viewer impact is predicted.

Where network-based mitigations have been exhausted and consumer-based mitigations are required, we suggest that support should be provided to all households reporting service break-up or loss since the switch-on of the LTE base station. We do not believe it is either reasonable or practical to discriminate between those with good or poor installations, the different multiplexes (including the HD multiplex), or the location of the TV set in the home. Where it is unclear if the LTE base station is the cause of their interference, consumers should be given the benefit of the doubt. While there is no absolute right to TV reception, nevertheless consumers are required to pay a licence fee to receive television, and we feel that DTT consumers may reasonably feel aggrieved that because of the launch of new mobile services, a TV reception system in which they have invested in good faith, no longer works as it once did.

We agree with Ofcom that where there are concentrations of predicted reception loss, which cannot be mitigated at the network level, then DTT filters should be mailed out proactively and prior to the LTE base station switch-on. We cannot at this stage suggest what the threshold for proactive mailing of filters might be.

Without having seen any evidence of how easy consumers find the filters to install we find it difficult to comment on whether installation support over the phone will be sufficient, or

whether installer call-outs might be required for those not able to do the installation themselves or with the assistance of friends or family.

4. The Delivery Mechanism ('MitCo')

It is a very early stage in the process to contemplate what an appropriate delivery mechanism for viewer support might be – before we understand either the consumer impact of the interference, or how it might be mitigated. We therefore offer just a few observations in relation to Ofcom's discussion of delivery mechanisms at this stage. We look forward to being given an opportunity to contribute further thoughts once the outstanding policy issues have been resolved.

It appears to us that 'MitCo' has been construed in the consultation to mean an organisation with two distinct functions:

- (i) Arbitration – acting as an adjudicator or 'mini-regulator', arbitrating between the mobile network operators and DTT operators, and making decisions on the mitigations that should be deployed (including instructing on the network-based mitigations that should be used by either mobile or DTT network operator). The consultation suggests this when it says that 'MitCo' would "*negotiate changes to network mitigation with new licensees*".
- (ii) DTT Viewer Support – once the LTE network *is* predicted to have an impact on the DTT viewer, supporting the DTT viewer to ensure that their DTT reception can be maintained or restored.

We would welcome Ofcom's views on whether we have correctly interpreted the dual roles of 'MitCo', but it strikes us that if this is the correct interpretation, then these are two very different functions that should be carried out by two different organisations. The former should be carried out by Ofcom itself, or an entity appointed by Ofcom with delegated powers to arbitrate between the mobile network and DTT operators. The DTT viewer support role should be fulfilled by a different organisation, and one with the DTT viewer's welfare at its heart.

As such, we do not believe that any of the three models posited in the consultation are viable, as they are all predicated on the notion that either the new licensees or MitCo arbitrate between the DTT and mobile networks.

5. Funding

We have not commented in detail on the funding proposals, which are more a matter for Government, Ofcom and the new licensees. Whatever the funding mechanism, it will be funded by the interferers: the new licensees. We find the tariff system difficult to understand, and believe it would be cumbersome to operate.

However, we note that there are four cost categories Ofcom has overlooked in the consultation: information systems; trade, landlord and other stakeholder communications; ongoing costs; and Ofcom's own costs.

Next Steps

For each question response we have proposed some further actions, which are summarised below. While some of this will be further desk-based research, we would strongly encourage Ofcom to plan a pilot (or series of pilots in different environments and using different parameters) to test the application of their assumptions in the real world. We would be very pleased to work with Ofcom, the mobile network operators, and the DTT multiplex operators to support any such pilots.

Next Steps in Response to Question 1

1. Providing further detail on (i) where, (ii) when, and (iii) how interference is expected to affect the DTT viewer; and analyse (iv) which channels will be lost in what numbers.
2. Releasing details of the reference GSM network topology to permit others to validate the Ofcom results.
3. Recalculating the interference loss figures based on feedback to this consultation, and provide a range of probable outcomes accompanied by a sensitivity analysis. This will include:
 - a. Undertaking a sensitivity analysis into LTE network topology.
 - b. Publishing a detailed assessment supporting the decision to ignore the impact of micro, femto and pico cells.
 - c. Re-basing all the calculations on a LTE base station power of 64dBm/10MHz.
 - d. Undertaking a sensitivity analysis of better than standard domestic aerial installations and worse than assumed off-beam performance.
 - e. Calculating all figures based on a full national calculation, rather than by extrapolation.
 - f. Further considering the impact of LTE on set-top reception.
4. Undertaking a series of further lab or field studies to validate the interference analysis:
 - a. Testing the susceptibility of typical domestic installations to interference;
 - b. Testing the susceptibility of domestic aerial amplifiers;
 - c. Testing of Communal Aerial System launch amplifiers;
 - d. Testing the susceptibility of early generation DTT products to mobile handset interference; and
 - e. Testing the interference potential of mobile handsets operating in real-world domestic premises.
 - f. Testing of the behaviour of receiver agc in the presence of pulsed signals
- We suggest that Ofcom, the Mobile Network Operators and DTT Multiplex Operators should work with the Digital Television Group (DTG) to agree the necessary testing schedule to address these six points.
5. Recalculating the remediation costs based on the revised figures.

Next Steps in Response to Question 2

1. Assessing the impact of LTE filter insertion loss on the performance of real-world domestic DTT installations.
2. Conduct consumer usability testing of DTT filters to ascertain how easy different consumer groups find them to install, in order to define the appropriate level of installation support.
3. Assessing of the likely scale of ongoing energy and maintenance costs associated with remediation of communal aerial systems.

Next Steps in Response to Question 3

1. Considering how existing TV advice lines, including Digital UK's, should diagnose and respond to the LTE interference calls they will inevitably receive.

Next Steps in Response to Question 5

1. Amend its cost assessment to include the four missing cost categories we have identified (trade, landlord and other stakeholder communications; ongoing costs; and Ofcom's own costs).

Finally, we look forward to hearing from Ofcom how the process will be run from now on. We presume there will be further work to be done in the early autumn to address some of the points we and others have raised, and that there will be a second consultation, refining and developing the thinking from the first, in the autumn.

We would encourage Ofcom to work openly and collaboratively with the full range of stakeholders as this further work is done, and look forward to playing a full and constructive part in that dialogue.

Introduction

About Digital UK

Digital UK is the independent not-for-profit organisation set-up by the public service broadcasters and the multiplex operators (BBC, ITV, Channel 4, Five, SDN and Arqiva).

We are leading the delivery of the Digital TV Switchover Programme which will complete at the end of 2012. We are also managing the delivery of the Channels 61/62 Clearance Project on behalf of the Multiplex Operators, which is likely to conclude in late 2013 or early 2014.

Our activities include:

- i. With Arqiva and the MuxCos, managing the roll-out of the new high-power digital terrestrial TV network;
- ii. Working with television equipment manufacturers, retailers and installers;
- iii. Advising social and private landlords on the readiness of their communal TV systems;
- iv. Communicating the switchover and clearance TV changes to consumers;
- v. Advising consumers on what they need to do through our Advice Line and website;
- vi. Liaising with the media and other stakeholders;
- vii. Working with charities and consumer groups to support viewers through switchover; and
- viii. Project management and research tracking.

About The TV Switchover Programme

TV switchover is the process by which DTT will be extended to reach 98.5% of UK homes – matching analogue terrestrial coverage before switchover. It has been Government policy since 1999 that switchover would only proceed if “everyone who could receive the main analogue services was able to receive the digital equivalents of those services” and that this would be “best achieved by ensuring that DTT coverage at switchover substantially matches that of analogue. In practical terms, this means ensuring that DTT coverage is available to 98.5% of UK households”³.

While there are small numbers who cannot get DTT after switchover, this principle of ‘universality’ is a fundamental tenet and the key consumer benefit of switchover. The switchover programme will bring Freeview services to more than 7 million UK homes for the first time. Indeed, our advertising and literature explains that “*Switchover is happening so that Freeview services...can be extended to people who can't currently get them*”⁴. We believe that the success of switchover to date is due in large part to the enormous value that consumers place on digital TV generally, and the extended availability of DTT (and new services such as HD on DTT) specifically.

As a result, more than 1.3 million UK homes have invested in Freeview equipment since switchover began in 2008, taking the total number of homes currently using DTT to 19 million (74% of all UK homes)⁵.

At the time of writing (August 2011) TV switchover has been completed for 41% of UK households, and has encountered few issues. It is on track to finish on time (by the end of 2012) and under budget. The Clearance Project is also progressing well, with the teams now

³ Source: Government Response to the Culture, Media and Sport Select Committee, Session 2005-2006: Report on Analogue Switch-Off [http://www.digitaltelevision.gov.uk/pdf_documents/publications/2006/Cm6850_govtresponse.pdf]

⁴ Excerpt from Digital UK's 3 month leaflet; taken from the Switchover Messaging Grid agreed with Government and Ofcom.

⁵ Source: Ofcom Digital TV Progress Reports

developing the timetable for the retrofit re-tunes that will come after switchover, and focused on ensuring the earliest practical end date. Digital UK is planning to close following completion of the Clearance Project.

The Scope and Purpose of Our Response

We note that this consultation marks a new era for spectrum management in the UK. Historically spectrum use has been predicated on one type of service not adversely affecting another in an adjacent part of the spectrum. For example, PMSE use of broadcast spectrum has always been very tightly managed in order to protect TV broadcast reception. Ofcom's decision to licence for LTE channels 61 and upwards, when they lie immediately adjacent to the channels which are used throughout the country for digital terrestrial television services is, as far as we are aware, the first time in the UK that a regulator will licence a new service knowing that it will adversely impact on consumers of the existing service – either impairing or removing the services they had been enjoying up to that point.

We are responding to this Ofcom consultation on 'Coexistence of new services in the 800MHz band with Digital Terrestrial TV' in order to represent the experience of the consumer, specifically the TV viewer, on their journey through switchover, clearance, and now, the possibility of interference from LTE services.

We also believe we have particular expertise in the following areas – gained through switchover - which we hope it is helpful to share with Ofcom and other stakeholders:

- In common with the multiplex operators and Arqiva the mast operator, a detailed understanding of the post-switchover DTT network and how it might react to LTE;
- Expertise with regards to both the behaviour of digital TV equipment and the different types of domestic aerial installation and how they might respond to interference from LTE services; and
- Considerable knowledge of communal system installations acquired through our close dealings with landlords through the switchover process, which are identified as being particularly at risk from LTE interference.

We understand that the Multiplex Operators and Public Service Broadcasters will separately submit a joint response. Therefore we will not comment on matters that relate specifically to them, such as licensing. Nor will we comment on matters that pertain beyond the lifetime of Digital UK, for example, the future impact of White Space devices, any plans for local television, or long term spectrum usage.

Consultation Question 1

Do you have any comments on our modelling approach and assessment of numbers of households affected?

1.1 Summary of Ofcom's Assessment

Table 4.2: Estimated number of UK households affected absent any mitigation

	Standard Installations	Communal Aerial Systems	Domestic Installations with Amplifiers	Total
Total number of households	16,300,000	5,210,000	5,660,000	27,120,000
Households affected by interference	110,000	550,000	100,000	760,000

Table 4.3: Estimated number of UK households affected in the absence of mitigation

Channel used for DTT	Standard Installations	Communal Aerial Systems	Domestic Installations with Amplifiers	Total
60	34,000	44,000	12,000	90,000
59	<100	56,000	14,000	70,000
58	5,000	19,000	4,000	28,000
57-51	26,000	27,000	8,000	61,000
≤50	48,000	400,000	64,000	510,000
Total	110,000	550,000	100,000	760,000

1.2 Summary of Digital UK's Response to Question 1

We have assessed Ofcom's modelling approach and its assessment of the numbers of households affected – which we believe is likely to be too low - and have several comments on this below. However, our first comment in response to this question is that we feel that the analysis and the consultation has been cast too narrowly. It attempts to *scale* the issue to a single figure, but gives us no feel for the actual *consumer impact* of LTE interference. We know from switchover that where, when and how DTT reception is lost very much influences the viewer's perception of this loss. We believe that Ofcom should provide far greater detail on (i) where the interference will appear, (ii) when it will manifest itself, and (iii) how it expect the interference to be experienced by the viewer and (iv) on which channels.

To return to the modelling and the figures: we believe that it is not possible to validate Ofcom's assessment that 760,000 households may be subject to interference without access to all the parameters which were used to arrive at this figure, which Ofcom has not yet shared in sufficient detail.

We note that, although Ofcom claims to have used conservative assumptions throughout, in practice this isn't the case - in particular with regards to the powers of the LTE base stations, which are assumed to be well below the allowable limit. In addition, a number of important parameters have been discounted, or the conclusion reached on the basis of a very limited amount of evidence.

Further, we believe that Ofcom has excluded the impact of LTE on the (at least) 5% of households known to be relying on set-top reception for their main set, and the (at least) 20% of households relying on set-top reception for second and third sets from the calculations. Also excluded are those households which have equipment with very poor technical performance.

It is our observation that multiple assumptions have been layered up to arrive at the final 760,000 homes figure. It would be helpful to understand the probable ranges of each of the assumptions in order to calculate the possible range of the final total figure and understand the sensitivity of the numbers.

Consequently, overall we believe that Ofcom's conclusion that 760,000 households would be affected by LTE interference, absent of any mitigation, is likely to be too low. We recommend that when Ofcom recalculates the figures - based on the various feedback it will receive to this consultation - it provides a range of probable outcomes accompanied by a sensitivity analysis so that stakeholders can more fully understand those assumptions which drive the estimate.

At the same time, we recommend that Ofcom provide further detail on (i) where, (ii) when, and (iii) how it expects the interference to affect the DTT viewer in the next stage of the consultation; and analyse (iv) which channels will be lost in what numbers.

We would encourage Ofcom to engage openly and collaboratively with all stakeholders as it conducts its further analysis, so that a broad consensus might be reached.

1.3 Detailed Digital UK Response to Question 1

In this section we first discuss

1. The further information we feel is needed, but not included in the consultation document, to understand the consumer impact (as opposed to merely the scale) of LTE interference.

Beyond that we consider Ofcom's assumptions about:

2. The possible future LTE network topology;
3. The assumed LTE network parameters;
4. How LTE mobile terminals will behave;
5. Household counting;
6. Assumptions about communal TV aerial systems;
7. Assumptions about domestic aerials;
8. Assumptions about domestic aerial amplifiers;
9. Assumptions about the behaviour of domestic DTT receivers;
10. Assumptions about the general nature of domestic television installations;
11. The propagation model used;
12. The modelling used; and
13. The cash cost estimate.

1.3.1 Understanding the Consumer Impact of LTE Interference

Ofcom's analysis is conducted at an aggregate level at a possible 'end state' for the LTE network. The analysis therefore arrives at one single figure (760,000) which scales the issue, but gives us no feel for the actual *consumer impact* of the issue.

We know from our switchover experience that (i) where, (ii) when (including in relating to other events), and (iii) how DTT reception is lost very much influences the consumer's perception of this loss.

An immediate and severe loss (i.e. blank screens as opposed to a degraded picture) in a concentrated area and affecting the public service channels will doubtless be very acutely felt, and perhaps suggests a need for proactive mitigation before the interference event.

A gradual, partial, scattered loss of services is naturally aggravating, but might allow for a reactive response.

We suggest that the factors to be considered are:

- Where interference will appear.
 - Will it be concentrated in urban areas?
 - Will some parts of the country be more prone to interference than others?
 - Will they be those areas with a history of reception difficulties?
 - Will losses be clustered together?
- When the interference will manifest itself.
 - Might LTE roll-out commence before the end of switchover in 2012; during the Clearance project in 2013; or beyond? How it interacts with other events like these will of course influence how the consumer perceives the interference.
 - When will the interference 'bite'; immediately roll-out begins, or at some breaking-point when the third operator launches, for example?
 - What will be the speed of the roll-out; months or years?
- How the interference will be experienced by the DTT viewer.
 - Will it be an overnight effect when a base station is switched on?
 - Will the interference be present continuously or intermittently?
 - Will the interference cause picture degradation, or a blank screen?
- Which channels will be lost.
 - How many homes might experience the 'overload' effect and find all their services lost?
 - How many homes might find some – but not all – services lost?
 - For those homes, what is the scale of reception loss of each of the PSB and commercial multiplexes?

Understanding each of these dynamics is extremely important to contemplating how severe the losses will feel to the viewer, and hence gauge their reaction to it, and their expectations of support.

We recommend that Ofcom provide further detail on (i) where, (ii) when, and (iii) how it expects the interference to affect the DTT viewer in the next stage of the consultation; and analyse (iv) which channels will be lost in what numbers.

1.3.2 LTE Network Topology

We agree that the use of a GSM network topology is a reasonable starting point for LTE network analysis. However, we note that the modelling has excluded any assessment of the impact of femtocells, picocells and microcells. While this may be an entirely valid approach, we recommend that Ofcom publishes some example calculations to demonstrate that these types of LTE cell would not have any impact on DTT reception.

We also note that Ofcom has changed the assumed network used as the basis of calculations compared to that originally reported to the Technical Working Group. The original analysis was based on an assumed LTE network comprising approximately 13,000 sites, whereas the current analysis is based on a real-world GSM network of 10,823 sites, with the impact of 2,012 low power sites ignored, resulting in a final network size of 8,811

sites. This change in network assumption appears to have had a significant impact on the predicted interference levels.

Independent analysis carried out by Arqiva on behalf of the Broadcasters and Multiplex Operators, and separately shared with Ofcom, has confirmed that the predicted levels of interference are very sensitive to the nature of the assumed LTE network, and because the network topology used by Ofcom in their calculations has not been published, it has not been possible to validate Ofcom's calculations

Given that the predicted numbers are sensitive to the nature of the network, and given that the LTE licences will not constrain either the number of base station sites, nor their locations, we believe Ofcom should not be calculating likely impact on the basis of one reference network without making the parameters of that network available to those wishing to respond to the consultation. **We therefore request that Ofcom find a way to release the information. Without it, it is impossible to confirm or gainsay Ofcom's figures.** Further, it is not apparent that Ofcom has carried out a sensitivity analysis on the impact of the network topology on predicted interference. We therefore request that one is undertaken as a matter of urgency.

1.3.3 LTE Network Parameters

We note that the Consultation is inconsistent in its assumptions about LTE base station powers, with values of 58.5dBm, 59dBm and 61dBm mentioned. The calculations appear to have been made on the basis of 58.5dBm, which is counter to the assertion that licensees generally operate base stations at the maximum licensable power, which at the very least would be 59dBm. Indeed, elsewhere the consultation states that the analysis assumes an LTE base station EIRP of 59dBm/10MHz [*"Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television"* section 1.12 part 2].

We further note that this consultation is inconsistent with the parallel Consultation on licence conditions, where section 4.10 of "*Consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters*" proposes a limit of 61dBm/5MHz, which is equivalent to 64dBm/10MHz. There is therefore a 5dB mismatch between Ofcom's licence proposals and the calculations on which the supporting evidence is based.

Section 6.104 of "*Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*" concludes that "*The number of affected households grows as an exponential function of the EIRP (in Watts) of the base stations; i.e. $N \propto P^{0.8}$* ". Given that Ofcom is separately proposing that the maximum LTE base station EIRP is increased from 59dBm/10MHz to 61dBm/5MHz, we query why the impact assessment has not used this same EIRP. **We recommend that Ofcom re-analyses the impact on DTT reception of raising the base station power levels by 5dB which must inevitably and significantly increase the number of households adversely affected.**

The independent Arqiva assessment shows that the number of households affected by interference increases by a factor of 3 if the power and out of band power limits proposed in the Technical Licence Conditions consultation document are used. Application of the Ofcom factor of $N \propto P^{0.8}$ alone would suggest that interference levels would increase by a factor of 2.4. This in turn suggests that Ofcom's estimate of 760,000 homes affected might be recalibrated to a figure of up to 2.3 million homes affected (nearly 10% of all UK homes).

Clearly power is a significant factor on interference levels, although the sensitivity to power requires further investigation, which runs counter to the assertion that controlling base station power levels would not be an effective mitigation technique and would be unduly onerous on the LTE licensees.

Note that the sensitivity to power is confirmed by a French study, published by the Agence Nationale des Fréquences⁶ which investigated the likely levels of interference in the Mayenne region. One of the conclusions of the study was that at 59dBm, 2.1% of households in Mayenne receiving channel 60 would be subject to interference, increasing to 4.9% at 64dBm, a factor of 2.3, which is similar to the Ofcom figure.

1.3.4 LTE Mobile Terminals

The assessment discounts the impact of mobile terminals on DTT reception, based on the findings of ERA Report 2010-0026 “LTE Interference into Domestic Television Systems”.

However, in that report, interference was demonstrated to set-top aerial reception in a limited number of cases, and we are concerned that the building construction materials of the test environment – a commercial building – may not be truly representative of those found in a typical UK home.

This is particularly relevant to test locations Lx2 and Lx3 which are physically close to the DTT reception equipment, but separated from the equipment of walls or partitions of unknown material.

We also note that Ofcom assumes that it is always possible to resolve any interference from a mobile phone handset to DTT by “simply...moving away from the TV” (section 2.10). However, this is obviously only possible if it is *your* handset interfering with *your* television. If you live in a terraced house, the range of LTE handsets is such that a phone your next-door neighbour placed near the party wall may interfere with your DTT service. In this scenario the interference cannot be so easily resolved.

Our experience of switchover has also shown that very early DTT products were prone to mobile phone interference. For example placing a 2G mobile phone making an outgoing call on top of or close to set top boxes could cause picture break up. We know from DSO that many homes still use early receiver models dating from the period 1998-2003 which largely could have been missed by the Ofcom testing. It is generally the case that older receivers become second or third sets when the main receiver is replaced, rather than being discarded, so they do need to be considered.

We recommend that further tests are carried out with a wider range of representative receivers and in locations which better represent real-world domestic premises to validate these results.

1.3.5 Household Counting

We note that the analysis has used the proportional method of counting to assess the number of households affected. While we agree that this is a reasonable approach for scaling the impact, nevertheless it runs counter to the cut-off method of counting used for evaluating DTT coverage, as touched on in section 5.97 of the consultation. This means that an impact that is assessed to be relatively small using the proportional method could result in a much larger loss to the headline DTT coverage figure. It is not appropriate to change the way DTT coverage is measured, but a mechanism for reconciling the two needs to be found otherwise the headline DTT coverage figure may be reduced without the necessary remedial steps being taken. This approach is consistent with that adopted for the protection of DTT coverage during the initial DTT roll-out programme and the subsequent 800MHz clearance programme, where new relay transmitters were constructed or considered to protect the headline DTT coverage figure.

⁶ Source: “Rapport ANFR Expérimentations Mayenne”, “etude_canal_60” and “Etude Canal 60 – Compléments”. Available for download at: <http://www.anfr.fr/fr/planification-international/etudes/compatibilite/bande-800-mhz.html>

We also note that the analysis is based on extrapolation from sample areas to reach a national figure. We do not believe that this is a reasonable approach because it introduces too many unnecessary simplifications and assumptions. **We recommend that a full national pixel-by-pixel analysis should be made to eliminate any inaccuracies introduced by the extrapolation process.**

1.3.6 Communal TV Aerial Systems

We are concerned that Ofcom were only able to test the performance of one launch amplifier, and that this device may not be representative of the performance of the full range of installed devices.

The Ofcom-commissioned report by Mandercom "*The impact of LTE on Communal Aerial Systems*" includes the warning (p11) that "*It is therefore difficult to model any mechanism for failure in the presence of strong signals*", with the recommendation that "...*further work is done to characterise the effects of strong signals in such devices*". **We urge Ofcom to accept and act on this recommendation by conducting further testing of the impact of strong LTE signals on a wide range of communal aerial system types.**

1.3.7 Domestic TV Aerials

We note that the Ofcom analysis had not modelled interference impacts on set-top aerials, although it is acknowledged that these may be somewhat more susceptible to LTE interference (section 4.39). The Digital UK Switchover Tracker Survey shows that 5% of homes used a set-top aerial on their main set, and that 20% of all secondary sets rely on set-top aerials. These proportions tend to be even higher in urban areas where viewers are more likely to be close to LTE base stations. In London, for example, 10% of main sets use a set-top aerial and 35% of secondary sets (all data taken from the March/April 2011 Digital UK / Ipsos MORI Switchover Tracker Survey). **We therefore believe that the potential impacts on set-top aerials are not insignificant and that further work should be done to test and model these impacts.**

1.3.8 Domestic TV Aerial Amplifiers

We are concerned that Ofcom were only able to test the performance of one amplifier, and that this device may not be representative of the performance of the full range of installed devices, particularly as consumer installations are generally poorly maintained and are only updated in extremis.

1.3.9 Domestic DTT Receivers

While the study considers a range of receiver performance, it needs to be borne in mind that there is no statutory control over domestic receiver performance and so we cannot know whether the models identified as having particularly poor performance are atypical, or whether more will enter the market.

While we welcome Ofcom's relatively cautious approach, nevertheless we consider that the minimum assumed receiver performance should be lower than that used in the study and that all potential reception failure mechanisms are considered. **We therefore recommend that the calculations are rebased assuming a lower receiver performance and that further tests should be performed to identify the extent to which poor AGC performance in the presence of pulsed signals will be a significant contributory factor to reception failure; something that is excluded from this study.**

1.3.10 Domestic Television Installations

We note that the 2010 ERA report for Ofcom “*LTE Interference into Domestic Digital Television Systems – 2010-0026 (Issue 2)*” considered the potential impact of LTE base stations and mobile terminals onto domestic installations, and that Ofcom is implicitly relying on some of the findings of this earlier report in drawing conclusion for this consultation.

We believe the scope for interference to be introduced into real-world domestic television installations may have been underestimated. The ERA study only considered a small number of limited scenarios, and even the worst-case installations tested were a shadow of the true horrors that are found in the real world. In addition, only brief attention was paid to the possibility of injecting interference into DSat systems.

Many homes use poor quality cable and have “rats nest” wiring behind the television. In addition, it is not unusual for homes to have sectioned cabling, split through passive or booster/splitters, feeding on to other rooms. Experience shows that significant numbers of home will have unprofessional “DIY” couplings of cables where the conductors are wound together, or connected through basic barrier strip electrical connectors and wrapped in tape to feed signals around the home. It is standard practice for DSat installations provided by BSkyB to feed services from the main receiver to another room via the RF2 coax /modulator output, which is typically factory-set to ch63, 65 or 68.

While it is true that, in the majority of cases, improving the quality of the installation would resolve any cases of interference, nevertheless this consultation is about scaling the size and cost of the solutions that will be required and so these issues cannot be discounted. We therefore believe that further work is needed to assess the likelihood that interference could be injected into DTT and satellite receivers through the connecting cables rather than just via the aerial.

1.3.11 Propagation Model

We are concerned that Ofcom may have placed too much reliance on the statistically small number of measurements made during the Tamworth field trial to validate their view on the appropriate propagation model for calculating LTE interference levels. While the values selected for standard deviation below 1km do not appear to be unreasonable, they cannot be regarded as definitive as there is little supporting evidence for them other than “they look about right” and several other conclusions could equally well have been drawn based on the same data. There must therefore remain a degree of uncertainty about the number of households that may be subject to interference and blocking.

1.3.12 Modelling

Section 7.4 of “*Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*” states “*In our modelling we are concerned with the impact of interference on a household’s ability to receive DTT. On this basis we do not include in our analysis households with non-standard installations where a standard installation would suffice for the reception of DTT.*” While it is rightly important to understand how the introduction of LTE could impact on access to DTT services, it must also be important to understand what the actual impact on the public will be in practice, because this will scale the likely public reaction and give an indication of how difficult it might be to identify cases of true loss of coverage from coverage lost due to inadequate installations.

Ultimately, whatever the underlying reason for the loss, someone will need to take action to address it, whether MitCo or the consumer, so foreknowledge of the scale is important. We therefore believe that Ofcom should also make an assessment of the upper bound of the likely impact to consumers with both poor quality installations, where the off-beam

performance is not as good as that assumed by the model, and also those, probably on the fringes of DTT coverage, where better than assumed aerial systems are in use

Suitable information may be found in the *Aegis Systems & i2 Media report 2106/HAC/R/3.0 "Domestic TV Aerial Research for Ofcom"* which concluded that "*Aerial system gain tends to be inversely proportional to available field strength*".

We also note that the modelling has excluded consideration of second and further sets connected via a distribution system. DTT reception by such receivers will need to be restored and they should be included in the calculations.

The modelling has excluded all receivers with very poor technical performance from the calculations. While it may not be reasonable to expect such devices to work in the presence of LTE, nevertheless they are in use and could fail; therefore an analysis of the extent to which such receivers will need to be replaced should feature in the calculations.

1.3.13 Cash Costs

Section 5.34 onwards and Table 5.3 of the Consultation summarises Ofcom's estimate of the likely cash costs of providing filtering. The analysis is neither as comprehensive nor as explicit as the technical aspects of the consultation and in some areas could be considered to be contradictory, so it is difficult to establish how Ofcom has reached these figures.

Our interpretation of the practical reality of the text, the table and the footnotes leads us to assume that, for standard installations, the cost analysis is based on proactively sending one filter to each household in an area ($100m \times 100m$ pixel) predicted to suffer interference, and then to further distribute 1.5 filters per predicted household on a reactive basis.

It is not clear whether the analysis includes commercial premises which might reasonably be accessing DTT either directly, or via a distribution system. The Ofcom-stated UK served household count of 27 million is lower than the current UK address count (including commercial premises) of circa 28.7 million (which reduces to 28.3 million after allowing for 98.5% household coverage of DTT) but this difference could be explained in one of three ways:

- The Ofcom address data is old;
- Commercial premises are excluded; and/or
- Northern Ireland, Isle of Man and Channel Islands addresses have been excluded.

Whatever the reason, **we request confirmation from Ofcom that it is their intention to include remediation of all DTT installations in the plan.**

Digital UK estimates that there is an average of 12 addresses (including commercial premises) per populated pixel, but we note that the actual number per pixel lies between 1 and approximately 700 (albeit the more extreme examples generally represent a small number of multi-occupancy buildings likely to have communal aerial systems), so the Ofcom estimate of 10 filters per pixel is probably slightly low.

This, coupled with the higher UK household count, means that on a like-for-like basis, the overall Ofcom estimate of filter costs is also on the low side.

Section 5.53 estimates the cost of repointing aerials to be in the range £50 - £100. As discussed elsewhere, generally, repointing is not possible and replacement is necessary. We therefore believe Ofcom should be using the current industry standard aerial system replacement cost of £180 as the basis for cost estimates. **The Ofcom figure is therefore significantly understated, and we recommend that Ofcom recalculate the cash costs based on the revisions to the cost assumptions we suggest.**

1.4 Summary of Recommended Further Work

Having reviewed Ofcom's modelling approach and assessment of the number of households affected we recommend that further work is required to validate Ofcom's conclusions:

1. Providing further detail on (i) where, (ii) when, and (iii) how interference is expected to affect the DTT viewer; and analyse (iv) which channels will be lost in what numbers.
2. Releasing details of the reference GSM network topology to permit others to validate the Ofcom results.
3. Recalculating the interference loss figures based on feedback to this consultation, and provide a range of probable outcomes accompanied by a sensitivity analysis. This will include:
 - a. Undertaking a sensitivity analysis into LTE network topology.
 - b. Publishing a detailed assessment supporting the decision to ignore the impact of micro, femto and pico cells.
 - c. Re-basing all the calculations on a LTE base station power of 64dBm/10MHz.
 - d. Undertaking a sensitivity analysis of better than standard domestic aerial installations and worse than assumed off-beam performance.
 - e. Calculating all figures based on a full national calculation, rather than by extrapolation.
 - f. Further considering the impact of LTE on set-top reception.
4. Undertaking a series of further lab and field studies to validate the interference analysis:
 - a. Testing of the susceptibility of typical domestic installations to interference;
 - b. Testing of the susceptibility of domestic aerial amplifiers;
 - c. Testing of Communal Aerial System launch amplifiers;
 - d. Testing of the susceptibility of early generation DTT products to mobile handset interference; and
 - e. Testing of the interference potential of mobile handsets operating in real-world domestic premises.
 - f. Testing of the behaviour of receiver agc in the presence of pulsed signals

We suggest that Ofcom, the Mobile Network Operators and DTT Multiplex Operators should work with the Digital Television Group (DTG) to agree the necessary testing schedule to address these six points.

5. Recalculating the remediation costs based on our revised figures.

Consultation Question 2

Do you agree with our high level conclusions on mitigation options?

2.1 Summary of Ofcom's Assessment

"5.108 Based on our knowledge of the problem so far, we initially conclude that:

- DTT receiver filtering and base station transmit filtering will form a core part of our preferred mitigation options;
- A platform change or adjustments to DTT equipment could fix most of the remaining problems but platform changes could affect the PSB and COM coverage levels;
- A limited number of households may experience loss of some or all of their DTT services and it may not be possible to restore them with an alternative platform; and
- Some additional mitigation options may be preferable in some cases, but this will depend on the specifics of where the base station is located and the local geography and we will not know this in advance of the auction of the 800 MHz band. In these cases rather than mandate mitigation techniques at this time, we think it would be more appropriate to use some form of incentive mechanism to ensure new licensees undertake network based mitigation where it is efficient to do so."

2.2 Summary of Digital UK's Response to Question 2

We generally agree with Ofcom's assessment of the available mitigations, and their technical effectiveness, subject to our more detailed comments below.

However, we believe that it is extremely important that Ofcom differentiates those mitigation options that are network-based (i.e. minimise the impact on consumers) from those that are consumer-based, and ranks the nine mitigations discussed in the consultation in the order with which they should be applied, with **network-based mitigations generally being considered before reaching consumer-based mitigations.**

We were concerned to see both within the consultation document, and more so at the Stakeholder Workshop, consumer-based mitigations which may cause some considerable disruption to consumers (e.g. needing to install DTT filters) being considered *before* network-based mitigation options. Indeed, at the workshop there seemed to be a strong preference for those solutions that are most "technically effective" at *restoring* the DTT service, rather than those that minimise disruption to consumers and *prevent* interference to the DTT service arising in the first place.

Further, where network-based mitigations have been exhausted and consumer-based mitigations are required, we believe that they should generally be made available in advance of the interference (i.e. so that the filters might be installed before the interference arrives, preventing any degradation to viewing), and not made available after the event in order to restore services some time after they have been disrupted. As such we further conclude a **preference to proactive consumer-based mitigations over reactive consumer-based mitigations.**

We believe that the appropriate order in which to apply the mitigations, in order to minimise viewer disruption, in descending order of preference, is:

- 1) Base Station transmit filtering
- 2) Base Station power reduction and/or relocation
- 3) Proactive DTT receiver filtering
- 4) Improvements or adjustments to DTT installations and equipment
- 5) Re-orientation of DTT aerials
- 6) Opposite to DTT polarisation
- 7) On Channel repeaters
- 8) Bespoke method
- 9) Platform change

We are also concerned that Ofcom makes no mention in the consultation of the broadcasters or the multiplex operators, the providers of the services which are being lost. We believe it is essential that the broadcasters and multiplex operators are consulted on how services to their customers are maintained.

We agree with the conclusion that new licensees should be incentivised to implement network-based mitigation where it is efficient to do so.

2.3 Detailed Digital UK Response to Question 2

2.3.1 Base Station transmit filtering

It is better to avoid the creation of a problem, rather than creating one and then attempting to solve it. We therefore strongly support the use of high quality base station filtering to minimise the scale of any out-of-band emissions and therefore reduce the scope for DTT receivers to be exposed to them.

We would advocate the use of high quality base station transmit filtering at every base station site, regardless of whether it is considered to be in a DTT "channel 60" area or not, because this will minimise the pollution of the adjacent spectrum which has consequent benefits for the existing DTT network and also any future services introduced into DTT spectrum, including White Space devices (noting that Ofcom may propose that White Space devices may be excluded from using channel 60).

It will always be more straight forward to design such filtering into the LTE network from the outset, rather than trying to require retrofitting in the future with all the consequential technical and funding issues that would raise.

This is consistent with the Ofcom view in the consultation "*Consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters*", where section 4.8 proposes to limit out-of-block emissions to the levels defined in Case A from all base stations.

2.3.2 Base Station Power Reduction

The key purpose of a power reduction is to reduce the level of the interfering LTE signal at the potentially affected receiving installations. There are three ways in which this could be achieved:

- 1) Reduce the EIRP of the offending site
- 2) Use an alternative site, more remote from houses
- 3) Avoid the use of LTE base-station frequencies likely to give rise to significant reception difficulties in particular geographic areas, on an exclusion basis

We believe that the pain of mitigation should not be all one way, so we support the concept of reducing the power of base stations, the use of an alternative, less troublesome site, or even geographic exclusion, as a mitigation option. We do not believe that it would be disproportionate to require operators to relocate base stations or avoid certain areas as a mitigation option, and while not the option of first choice, it should not be discounted.

As mentioned earlier, we note that Ofcom's technical study confirms that predicted interference levels are very sensitive to the base station power, so use of the minimum possible power for each base station would be a beneficial step.

2.3.3 Proactive DTT receiver filtering

We agree that the installation of filters within DTT receiving systems could also be a useful mitigation tool, and believe that wherever feasible these should be made available in advance of the interference event, so that filters can be installed to prevent any degradation to viewing, and not after the event, once services have already been disrupted.

However we do not underestimate the challenge in arranging for the distribution and, more importantly, correct installation of such filters.

We note that the impact assessment has not considered the insertion loss of the DTT receiver filters and the possible impact this will have on reception (Section 6.21 of "*Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*"), particularly given that previous research has indicated that the majority of receiving installations in the UK are only just good enough for reliable DTT reception. There will therefore be many cases where the installation of a filter will reduce the received DTT signal level to the threshold of failure, or below. It needs to be decided how such situations will be managed, the first problem being for the consumer (or installer) to identify whether reception has failed due to the filter itself being faulty, it being incorrectly connected, or the overall receiving installation not being of an adequate standard.

2.3.4 Improvements or adjustments to DTT equipment

We agree that adjustments to DTT equipment (removal of an aerial amplifier, provision of a replacement antenna system, provision of a higher quality DTT receiver) are likely to restore access to DTT services in many cases. However, these solutions would obviously also incur very significant disruption to consumers. For this mitigation technique to be effective, the term "improvements or adjustments to DTT equipment" must encompass any or all of the constituent parts of a DTT reception system, including:

- Removal of an aerial amplifier
- Provision of a replacement antenna system
- Provision of DTT reception equipment with a higher resistance to interference
- Upgrading of internal distribution cabling

Where interference is caused to installations where consumers are forced to use set-top reception due to the action or inaction of their landlord, then steps need to be taken to encourage or oblige the landlord to provide the means for their tenants to obtain adequate DTT reception.

2.3.5 Re-Orientation of DTT aerials

This is a slight misnomer since the aerial is extremely likely to require replacement as well as repointing, either due to age or because it is of the incorrect group for the new transmitter. In fact, we would recommend that no aerial is repointed without replacement. Note that it is our experience that even after less than a year bolts or lashing kits can become rusted or

weathered sufficiently to prevent rotation of an aerial and therefore it is common for an installer to fit a new aerial even where the existing one is of the correct group.

We are concerned that the use of an alternative transmitter may reduce consumer choice, either by requiring them to watch a regional service other than the one of their preference, or where the change is from a main transmitter to a relay transmitter, by removing access to the commercial multiplexes. Use of an incorrect regional service, or downgrading the number of channels available should be an act of last resort, and in both cases the consumer should be given the option of retaining access to the degraded version of the services in addition to the replacement service, where this is technically possible to achieve. The importance of the perceived relevance and personal aspects of regional services to consumers should not be underestimated. Recent Digital UK analysis for the Central, Anglia and Yorkshire regions demonstrated that, where overlapping coverage occurs, many consumers do not like to receive the "incorrect" region and that around 70% want a resolution that returns their preferred and expected regional news and weather presenters.

2.3.6 On-Channel Repeaters

We agree that On-Channel Repeaters may be a useful tool in specific circumstances, but the uncertainties around their installation, and the complex contractual arrangements that would be required to support them, mean that they are not an option for general use. However, they should not be completely dismissed as an option.

2.3.7 Opposite to DTT polarisation

We do not believe this to be a generally viable mitigation option for three main reasons:

- the opportunity to use vertical polarisation at an LTE base station will be geographically constrained to areas where there are no vertically polarised DTT transmitters also in use
- it is not possible to rely on consumer receiving antennas exhibiting the anticipated cross-polar discrimination due to the variety of designs in use and age-related deterioration
- clutter in the vicinity of the LTE base station will tend to depolarise the signal, resulting in a reduction in the opportunity for cross-polar rejection at the receiving antenna

We acknowledge that there may be a small number of specific circumstances where opposite-to-DTT polarisation may be of use in reducing interference, so the technique should not be completely ruled out.

2.3.8 Bespoke Method

We agree that bespoke solutions such as those contemplated in the consultation, should be considered.

2.3.9 Platform Change

We believe that the provision of an alternative television platform should be the option of last resort because the alternative is not a true replacement for DTT either in the range of services provided or the facility with which access can be obtained.

We disagree that there may be a small number of cases where provision of television by any means cannot be achieved, because in these cases provision of a broadband service via the LTE network giving rise to the problem should be possible.

2.3.10 Communal Aerial Systems

As with domestic filters, we believe that communal aerial filters should be fitted proactively and ahead of the interference event wherever possible. This prevents any disruption to viewing in the first place, rather than restoring services after the disruption has been felt.

We are concerned that Ofcom is oversimplifying the ease with which communal aerial systems can be modified. The Ofcom-commissioned report by Mandercom "*The impact of LTE on Communal Aerial Systems*" includes the warning "*Finding where systems are and getting access to them is often not straightforward*".

Even where ownership and access can be identified, it will not necessarily be the case that there will be room within the existing storage space – most often situated on the roof of a block of flats or in small distribution cupboards – to house the complex high quality filters contemplated by the study. It is possible that in some cases a new storage facility will need to be built to house the filters.

Further, Ofcom should note that there will be ongoing energy and maintenance costs associated with the new communal aerial filters. For example, where channel-specific filters are used, the block landlord will need to call out an aerial installer to re-tune the filter every time there is a frequency change at the DTT transmitter. Equally, where low-pass cut-off filters are used, a replacement device will be required if a new DTT service is introduced on a channel above the filter cut-off frequency. Ofcom will therefore need to consider how the continuing costs of supporting filters used in communal aerial systems will be met.

2.4 Summary of Recommended Further Work

Having reviewed Ofcom's high level conclusions on mitigation options, we suggest that there is some further work that needs to be done to test the findings:

1. An assessment of the impact of LTE filter insertion loss on the performance of real-world domestic DTT installations
2. An assessment of the ability of a range of viewers to successfully fit domestic filters.
3. An assessment of the likely scale of ongoing energy and maintenance costs associated with remediation of communal aerial systems.

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?

3.1 Summary of Ofcom's Assessment

"Initial conclusions on consumer support

- 6.14 *Interference into DTT from new mobile services is likely to affect some DTT consumers to varying degrees. Our view, as set out in section 5, is that mitigation in the form of DTT receiver filters is likely to be cost effective; this will necessarily involve direct contact and interaction with DTT consumers. In view of these factors, we presently suggest that:*
- *Information and advice should be made available to all DTT households that are likely to be affected in advance of new network roll-out and for a period thereafter. At a minimum, this should include coordinated information campaigns and the availability of a dedicated call centre and website; and*
 - *Consumer-based mitigation including DTT receiver filters should be provided to households in some manner.*
- 6.15 *We are not making a firm proposal in this consultation on the level of consumer support that should be offered because we do not think there is currently sufficient evidence at this stage to do so.*
- 6.16 *We will therefore undertake further work over the summer to consider this issue in greater detail. As part of this, we expect to undertake further research to investigate the costs and impacts of the choices and options set out above. One of our key objectives will be to provide as much certainty as possible as soon as possible and in particular before the auction for the 800 MHz band begins."*

3.2 Summary of Digital UK's Response to Question 3

Without a fuller assessment of the consumer impact of the LTE interference, and the consumer impact of the various mitigations, we find it difficult to gauge the appropriate level of consumer support, or how it should be delivered.

This aside, we agree that it is very probable that managing the impact of LTE interference on the DTT consumer will require information and advice to be available. This should be available reactively via a contact centre and website, but may also need to be advertised proactively in areas where a significant viewer impact is predicted.

Where network-based mitigations have been exhausted and consumer-based mitigations are required, we suggest that support should be provided to all households reporting service break-up or loss since the switch-on of the LTE base station. We do not believe it is either reasonable or practical to discriminate between those with good or poor installations, the different multiplexes (including the HD multiplex), or the location of the TV set in the home. Where it is unclear if the LTE base station is the cause of their interference, consumers should be given the benefit of the doubt. While there is no absolute right to TV reception, we feel that DTT consumers may reasonably feel aggrieved that because of the launch of new

mobile services, a TV reception system in which they have invested in good faith, no longer works as it once did.

We agree with Ofcom that where there are concentrations of predicted reception loss, which cannot be mitigated at the network level, then DTT filters should be mailed out proactively and prior to the LTE base station switch-on. We cannot at this stage suggest what the threshold for proactive mailing of filters might be.

Without having seen any evidence of how easy consumers find the filters to install we find it difficult to comment on whether installation support over the phone will be sufficient, or whether installer call-outs might be required for those not able to do the installation themselves or with the assistance of friends or family.

3.3 Detailed Digital UK Response to Question 3

3.3.1 Provision of Information and Advice

We agree with Ofcom's proposal that all consumer information and advice must be centrally co-ordinated in order to ensure clarity and consistency of messages.

We agree with Ofcom that reactive consumer information and advice should be available via a telephone call centre and website. We suggest that a full service contact centre should be used, to service consumer enquiries by white mail, email, webchat and possibly text, as well as by the telephone.

It is important to note that if LTE interference begins while Digital UK remains extant (i.e. before the end of 2013, when the Channels 61/62 Clearance Project is expected to conclude), then Digital UK will receive calls on this matter. Having helped TV viewers through switchover, we are increasingly finding that viewers call us back for any type of TV reception problem. For example, during the high pressure weather of October 2010 which impacted TV reception, Digital UK received more than twice as many calls as all the other broadcasters combined. The Digital UK contact centre will therefore need to be fully briefed on the timing and impact of the LTE roll-out, and will need to agree with Ofcom how calls arriving at its Advice Line should be handled. Similar briefing will need to be provided to broadcaster advice lines, particularly BBC Reception Advice.

We agree with Ofcom that in at least some cases consumer information will need to be advertised proactively, probably on a regional or locally targeted level – depending on how the LTE mobile network will be rolled out. If communications can be conducted on a regional level we would fully expect regional television advertising to be used. Our experience shows that viewers expect messages about the TV reception to be delivered via TV. If communications need to take place at a local level, we would expect it to make use of local advertising media such as local radio and local press. This might, for example, be an information-style press ad alerting viewers to the possibility of reception problems as the LTE mobile operators roll out their network, and advising them which number to call, or website to visit, for further information and advice.

3.3.2 Provision of DTT Filters

Where DTT filters are provided - to resolve reception issues not already addressed at a network level – we believe that filters should be provided to all households reporting service break-up or loss since the switch-on of the LTE base station.

We do not believe it is either reasonable or practical to discriminate between those with good or poor installations, the different multiplexes (including the HD multiplex), or the location of the TV set in the home.

To attempt such a discrimination would, we suspect, only aggravate viewers already considerably inconvenienced by the interference. It would be exceedingly difficult to assess and police: it is impossible to confirm the condition of a viewer's TV system; or the location of their TV set; without a home visit, which would be entirely disproportionate.

Where it is unclear if the LTE base station is the cause of their interference, consumers should be given the benefit of the doubt. While there is no absolute right to TV reception, we feel that DTT consumers may reasonably feel aggrieved that because of the launch of new mobile services, a TV reception system in which they have invested in good faith, no longer works as it once did.

3.3.3 DTT Filter Installation Support

We have not seen or attempted installation of the type of DTT filter Ofcom is suggesting. Nor has Ofcom done any consumer usability testing of the filters to ascertain how straightforward they are for different consumer groups to install. We therefore find it very difficult to comment on whether or how far the help of friends and family, or professional installation support, may be needed.

If further research suggests the need for at least some degree of professional installation support, Ofcom will need to consider how that support is organised, and on which conditions or criteria it is deployed.

3.3.4 Timing of Support

Again, without knowing the LTE roll-out timetable it is difficult to gauge whether and where advice is best offered proactively or reactively.

However, we can imagine that in predicted areas of high concentrations of LTE interference, it would be wise to pre-warn DTT viewers of the possibility of reception difficulties, and dispatch DTT filters proactively.

3.4 Summary of Recommended Further Work

We suggest that Ofcom should:

1. Consider how existing TV advice lines, including Digital UK's, should diagnose and respond to the LTE interference calls they will inevitably receive.

Consultation Question 4

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

4.1 Summary of Ofcom's Assessment

"Provisional Conclusions

- 6.45 We provisionally consider that the hybrid approach 3 is the best choice and should be adopted as it will provide the best opportunity of obtaining a successful outcome.
- 6.46 While it is not without significant challenges it avoids the major problems of approaches 1 and 2. For approach 1 new licensees making decisions presents too much risk of harm to DTT consumers and other stakeholders' businesses and therefore is not tenable. For approach 2 a regulatory body mandating the parameters of network roll out, perhaps on a site by site basis, presents too much of a risk of both delay to roll out and significant and unpredictable costs being imposed on those new licensees.
- 6.47 Subject to this consultation, we will need to develop the details and parameters of approach 3, including:
- the functions and duties of MitCo and how it is created (this may require the involvement of Government);
 - how viewers might best be communicated with and helped on an ongoing basis;
 - the form and parameters of the tariff mechanism;
 - how licensees interact with MitCo regarding provision of information and coordinated timing of network rollout and activation with provision of consumer based mitigation measures; and
 - the circumstances under which a 'backstop power' to impose restrictions on network roll out or site deployment in specific cases might be exercised.
- 6.48 Assuming we decide to pursue this option further, these details will be the subject of a further consultation in the autumn."

4.2 Digital UK's Response to Question 4

It is a very early stage in the process to contemplate what an appropriate delivery mechanism for viewer support might be – before we understand either the consumer impact of the interference, or how it might be mitigated. We therefore offer just a few observations in relation to Ofcom's discussion of delivery mechanisms. We look forward to being given an opportunity to contribute further thoughts once the outstanding policy issues have been resolved.

It appears to us that ‘MitCo’ has been construed in consultation to mean an organisation with two distinct functions:

- (iii) Arbitration – acting as an adjudicator or ‘mini-regulator’, arbitrating between the mobile network operators and DTT operators, and making decisions on the mitigations that should be deployed (including, perhaps, instructing on the network-based mitigations that should be used by either mobile or DTT network operator). The consultation suggests this when it says that ‘MitCo’ would “negotiate changes to network mitigation with new licensees”.
- (iv) DTT Viewer Support – once the LTE network is predicted to have an impact on the DTT viewer, advising and supporting the DTT viewer to ensure that their DTT reception can be maintained or restored.

We would welcome Ofcom’s views on whether we have correctly interpreted the dual roles of ‘MitCo’, but it strikes us that if this is the correct interpretation, then these are two very different functions that should be carried out by two different organisations.

The arbitration role should be carried out by Ofcom itself, using its regulatory powers, or by an entity appointed by Ofcom with delegated powers to arbitrate between the mobile network and DTT operators.

The DTT viewer support role is a very different one, which might involve making available reception advice through a contact centre, mailing filters to those that might need them, and providing advice or assistance on how to install those filters. The organisation fulfilling this role should be one with the DTT viewer’s welfare at its heart.

As such, we believe that if the arbitration function is fulfilled by Ofcom or its subsidiary, then ‘MitCo’ should be solely concerned with managing DTT consumer mitigations, and assessing which of these (DTT filters, changes to DTT aerials or systems, or platform changes) is most appropriate for the consumer. We do agree that such consumer support should be provided by a single organisation - not a multiplicity of organisations

We question how workable a tariff system is, and how cash costs, particularly non-cash costs, can be accounted for in any tariff system. We wonder if there is a useful parallel with the switchover ‘Code of Practice’ process, where predicted interference impacts (in this case, within the terrestrial TV network) below a pre-agreed threshold, are allowed to proceed, whilst those over the threshold trigger a Code of Practice process where possible network mitigations are explored, before being handed to MitCo for consumer-based mitigations.

As such, we do not believe that any of the three models posited in the consultation are viable, as they are all predicated on the notion that either the new licensees or MitCo arbitrate between the DTT and mobile networks. We believe that arbitration should be the role of Ofcom or its nominated subsidiary.

Consultation Question 5

Do you agree with the options, the assessment approach and our initial conclusions? What are your views on costs risks and how to deal with them?

5.1 Summary of Ofcom's Assessment

"6.56 We suggest that there are good reasons for attributing controllable and predictable costs to new licensees, including a lump sum intended to recoup fixed costs of mitigation. The tariff mechanism would play a key role in determining and attributing costs to new licensees. This approach would necessarily leave a residual cost risk and it is for consideration how these might best be borne."

5.2 Summary of Digital UK's Response to Question 5

We will not comment in detail on the funding proposals, which are more a matter for Government, Ofcom and the new licensees.

Whatever the funding mechanism, we agree it should be funded by the interferers. However, as noted in our response to Question 4, we find the tariff system difficult to understand, and believe it would be cumbersome to operate.

We note that there are four cost categories Ofcom has overlooked in the consultation: information systems; trade, landlord and other stakeholder communications; ongoing costs; and Ofcom's own costs.

5.3 Detailed Digital UK Response to Question 5

5.3.1 Cost categories

In addition to the cost categories mentioned in section 6.5.1 of the consultation, the following cost categories should also be taken into account:

- i. Information Systems - The costs of information systems to support the effective management of the consumer impact of LTE roll-out. For example, we foresee a need for a postcode checker with both DTT coverage data and LTE network roll-out and coverage data as inputs, which could predict whether a particular address might be expected to receive interference from the LTE network. This would enable any advice line to take a callers postcode, input it to the system, and diagnose whether or not their reception problem may be attributable to LTE interference as opposed to one of many other possible causes. If the description fits that of possible LTE interference, this might trigger the dispatch of a filter.
- ii. Trade, Landlord & Other Stakeholder Communications Costs – While Ofcom acknowledges the need for information to consumers, it should also take account of the need to inform the following groups, and their associated costs:
 - a. *The trade* - in particular aerial installers, equipment manufacturers and electrical retailers;
 - b. *Landlords* – including private and social landlords owning communal systems that may be affected by LTE interference; and

- c. *Other Stakeholders* – which may include the relevant press (including specialist technology press) and elected representatives.
- iii. Ongoing Costs – As noted in 2.3.10 above, there will be ongoing energy and maintenance costs associated with the installation of filters to communal systems in particular. Ofcom will need to consider how this cost category will be met.
- iv. Ofcom's Own Costs – If, as we suggest, Ofcom will need to maintain an arbitration role in deciding whether to deploy mobile network of DTT consumer based mitigations, Ofcom will itself incur management costs which should presumably be accounted for.

5.3.2 Predictability of costs

We agree that it will be very difficult to precisely anticipate the numbers of consumers requiring information and/or assistance, and the costs associated with that. We expect that Ofcom will need to secure access to contingency funding should the costs turn out to be higher than originally anticipated.

5.3.3 Who pays

We agree that the mitigations should be funded by the interferers – i.e. the LTE mobile operates.

As noted in our response to Question 4, we find the tariff system difficult to understand, and believe it would be cumbersome to operate.

5.4 Summary of Recommended Further Work

We suggest that Ofcom should:

1. Amend its cost assessment to include the four missing cost categories identified in 5.3.1 above.