

# DigitalUK

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**Response to Ofcom consultation**

**Coexistence of new services in the 700MHz band with digital terrestrial television**

18 July 2017

This response is submitted by Digital UK on behalf of its Members – the BBC, ITV, Channel 4 and Arqiva - the holders of the terrestrial Broadcasting Act and Wireless Telegraphy Act licences.

## 1. Introduction

### 1.1 About Digital UK

Digital UK supports the UK's terrestrial TV service and its viewers.

We are responsible for day-to-day operational management, including the Freeview electronic programme guide, and lead on developing platform strategy, working with our broadcast partners and industry. We also work in conjunction with Freeview to provide viewers with information and advice about terrestrial TV channels, services and reception.

In September 2015, Digital UK and Freeview launched 'Freeview Play', the new connected TV service which seamlessly delivers on-demand content alongside linear broadcast channels, free from subscriptions.

Digital UK is owned by the BBC, ITV, Channel 4 and Arqiva.

### 1.2 About Digital Terrestrial Television (DTT)

Digital Terrestrial Television (DTT) is the UK's most widely used TV platform. At the heart of DTT in the UK is Freeview – a universally available service offering a range of more than a hundred free-to-air TV, radio and text-based services. It is watched in more than 19 million homes, three-quarters of the total. Freeview is the sole television service in more than 9 million homes.

Prior to digital switchover (DSO), more than four million UK households could not access Freeview and elsewhere signal strength was variable. Thanks to industry investment in excess of a billion pounds, switchover made Freeview available to 98.5 per cent of homes.

A strong and competitive Freeview delivers significant benefits to the UK society and economy, through:

- choice for consumers: Freeview's compelling free-from-subscription TV services sustain competition in TV platforms and support consumer choice in the broader converged market. Freeview's offer ensures UK viewers can continue to enjoy high quality TV without having to be tied to a bundle;
- citizens benefits: DTT delivers universal availability for PSB services in a way that cannot be matched by other delivery technologies over the foreseeable future without significant cost and disruption to viewers;
- un-intermediated, mass market audience reach for broadcasters: Freeview's scale sustains the economics of free to view broadcasting in the UK;
- innovation in consumer electronics through open standards: working with our partners, we coordinate the technical requirements for DTT receivers (TVs and set top boxes), across Freeview, Freeview HD and Freeview Play products. This sustains the horizontal market and encourages manufacturers to innovate while ensuring interoperability and broad choice of quality products for viewers.

## 2. Executive Summary

Digital UK welcomes Ofcom's work to manage coexistence risks between future mobile services in the 700MHz band and adjacent DTT services.

While at a high level we share Ofcom's view that the number of DTT households to be affected from interference from mobile services at 700MHz may be relatively small, further work is required around this and there are important points Ofcom should consider before any conclusions are drawn.

- Ofcom's technical analysis assumes that mobile networks at 700MHz will use broadly the same topology and technical parameters as those at 800MHz. Should this not be the case further work should be conducted to reflect real world deployments.
- The mitigating effects of improving performance of TV receivers are likely to be slower to come to fruition than Ofcom anticipates, as TV set replacement cycles are getting longer and many older primary sets are likely to remain in use for DTT reception as secondary TVs.
- Worst case DTT signal levels are likely to be lower than Ofcom assumes, as demonstrated by real-world measurements by Ofcom and DMSL in Winter Hill and Selkirk in preparation for 700MHz clearance.
- It is not clear whether Ofcom's broad assumptions on LTE traffic levels (and resulting interference to DTT receivers) are reasonable in the context of ongoing evolution of 4G networks and usage levels.
- The scale of interference from mobile base stations at 800MHz is likely to represent an upper bound predictor of equivalent issues at 700MHz, but more issues than currently anticipated may emerge as 800MHz deployments progress
- A substantial number of households are likely to continue to rely on set-top aerials for DTT reception and these viewers should be given appropriate consideration, especially in light of their legitimate expectations and susceptibility of set-top aerials to out-of-block emissions from mobile terminals, which filters cannot mitigate. While useful, filters are not a panacea, and their deployment would need to carefully manage any negative effects. As well as being of limited relevance to set-top aerial uses, a future mitigation programme should also ensure viewers do not cascade 800 and 700MHz filters.
- Coexistence mitigation policies also need to ensure viewers maintain reception to COM7 and 8 when these multiplexes use channels 55 and 56. This raises further downsides to the use of filters, which would prevent reception at these frequencies. It also highlights issues with Ofcom's proposals around the use of Group K aerials. While these are likely to be helpful in managing interference from mobile services once no DTT services are transmitted above ch 48, practical guidance to aerial installers should continue to refer to wideband aerials until the timescales of future use of channels 55 and 56 for COM7 and 8 become clearer.

Ofcom should explicitly consider these points in new technical analysis and in any new phase of policy work.

### 3. Response to consultation questions

Digital UK and its members welcome the opportunity to respond to this consultation on 700MHz co-existence issues and we also welcome the fact that Ofcom has undertaken additional work to better understand the likely impact of future mobile services in the 700MHz band on DTT reception for consumers.

We note that Ofcom has yet to formally determine the technical parameters for mobile services operating in the 700MHz band. We also note that the practical studies and analysis set out in the consultation document and the supporting technical report are based on mobile network parameters and topology essentially similar to those used currently in the 800MHz band, including the use of 5MHz or 10MHz LTE blocks. This assumption is key to the validity of the technical analysis and conclusions drawn, in particular those relating to interference arising from mobile terminals where the assumed block size dictates the worst-case out-of-block performance for mobile terminals (-42 dBm/8MHz ACLR in the proposed CEPT 700MHz band plan).

Ofcom's analysis and our responses to the three questions posed, set out below, are only valid if this set of assumptions is realised in practice. In the event that Ofcom elects to licence the band with different technical parameters, a further coexistence analysis and consultation would be required prior to the start of the licensing process to determine the impact on and appropriate mitigation for DTT and other services that share the retained DTT spectrum.

*Question 1 Do you agree with our conclusions that a) the risk of interference from mobile handsets to DTT will be minimal and b) the risk of interference from mobile base stations in 700MHz to DTT will be broadly similar to the risk for 800MHz, with some tens of thousands of households potentially affected?*

We note that Ofcom's analysis is primarily based on practical data and extrapolation rather than modelling. We believe that this is a reasonable approach providing that the captured data and extrapolation is robust and is based on a sufficiently large sample size and a broad range of scenarios to ensure that all aspects of coexistence are adequately explored. We do not believe that modelling results should be completely discounted, but modelling and real-world data should be used in tandem to provide appropriate sense-checking and to avoid inadvertent "tuning" of the results to support previously formed opinions. While the consultation and supporting technical report provide information about the tests and methodology used, not all the tests and supporting evidence are provided, and the measurement samples are small, so we are not in a position to determine the robustness of all the numerical results although we do generally agree with the conclusion drawn.

#### Mobile handset interference to DTT

We agree that the risk of interference from handsets to fixed installations is likely to be small, but believe that Ofcom has understated the risk for three reasons:

1. Improvements in TV receiver performance will not occur as quickly as assumed

Ofcom have assumed that main TV receivers are typically replaced every 8 years. While this has been the case in the past, recent TV sales trends suggest the replacement cycle is getting longer. The number of TVs sold in the UK in 2016 was

7% lower than in 2015 and sales over the first quarter of 2017 were more than 15% lower than in Q1 2016<sup>1</sup>. As economic uncertainty affects consumer confidence, there are likely knock-on impacts on deferrable purchases. We consider it unlikely sales trends will reverse in the short term and this could push replacement cycles towards 10 years.

In addition, it is often the case that replaced TV receivers are moved to a new location, such as the kitchen or bedroom, to become an additional set and these sets are more likely to be used to access DTT services than the main set. While Ofcom may not seek to protect the usage of additional sets, nevertheless they are extensively used and the reputation of the DTT platform would be compromised if such use were curtailed due to 700MHz handset interference.

We also note that the measured difference in performance between DVB-T and DVB-T2 receivers is more likely attributable to the benefits arising from the use of interleaving in DVB-T2, rather than on the receivers having an inherently better performance.

2. The worst case signal level will be lower than assumed

Ofcom has assumed a worst-case DTT signal level of -65dBm, being “a level 3 dB lower than the typical minimum level that most aerial installers would consider satisfactory”. While we may wish that the guidance contained in the CAI Code of Practice reflected reality, it is the case that real-world measurements made by Ofcom and DMSL in the Winter Hill and Selkirk areas in preparation for and as part of 700MHz clearance have reconfirmed the fact that approximately 15% of households access DTT services at levels below 45 dBµV (-62dBm) and approximately 10% of households have levels of less than 42dBµV, i.e. one in ten households are currently using a DTT service at levels up to 7dB **lower** than the Ofcom worst case.

3. LTE traffic levels may grow to levels greater than those assumed

Ofcom’s traffic analysis is based on assumed 700MHz uplink traffic levels (described in section 6.6 of Annex 1) which are extrapolated from measured 800MHz data. While the nature of the extrapolation is given (i.e. the traffic on the busiest 800MHz network was doubled), there is no explanation as to why a factor of 2 is appropriate since the measured and historic data is derived from an immature market, where:

- 800MHz LTE-capable handsets are not yet universal
- not all consumers have 4G contracts
- not all the virtual MNOs yet offer LTE services
- the network operators themselves manage traffic volumes by off-loading to their 3G and 2G networks in areas of congestion
- Wifi offloading may reduce as data allowances increase

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<sup>1</sup> Source: GfK point of sale data.

We therefore cannot be certain that past traffic growth accurately reflects the possible future growth once these limitations of access to 800MHz LTE networks are removed in a developed market. It is therefore possible that traffic levels will exceed those assumed in the analysis.

Given the above points, we would expect the incidence of interference events to be higher, and for the rate of decay to be lower, than that suggested by Ofcom's analysis. We recommend that Ofcom recalculates the interruption rate to reflect the true range of real-world DTT reception conditions and LTE traffic growth.

### Mobile base station interference to DTT

We agree that, in the absence of any information to the contrary, it is reasonable to assume that the majority of future 700MHz LTE base stations will be co-located with existing 800MHz base stations, sharing much of the infrastructure. However, the 800MHz roll-out programme is not complete and without knowledge of the locations where transmitters have yet to be installed we cannot be certain that the current reducing trend of interference cases will continue to the end of the programme. Experience to date has highlighted the difficulty with predicting exactly where noticeable levels of interference will arise and a number of unexpected hotspots have been found. There is still scope for further surprises to arise.

That said, despite the uncertainties, we agree that the projected number of 800MHz interference cases would be a reasonable estimate of the upper end of the range of new cases arising from 700MHz transmissions. We note that there is the potential for some of these cases to affect households that have already suffered from 800MHz interference and that these will require particularly sensitive handling.

*Question 2 Do you have any comments on our analysis of coexistence risks related to set-top aerials, direct signal ingress to receivers, impact of DTT on mobile services and interference to cable TV?*

### Set-top aerials

Digital UK commissioned YouGov to include four questions relating to DTT aerial types in an online Omnibus survey conducted over the period 17<sup>th</sup> – 20<sup>th</sup> October 2014. The results were that:

- The proportion of main sets connected to set-top aerials across the UK was around 7%, but with significant regional variations.
- The proportion of secondary sets connected to set-top aerials was around 18%.
- Overall, set-top aerials were used for around 3.6 million DTT receivers, 740,000 of which were the main set.

These results were not dissimilar to the findings of a 2011 Digital UK review of the set-top aerial data collected by various agencies over the period 1996 to 2011, which concluded that *“the proportion of main sets connected to a set-top aerial remains constant at about 5%, but with significant regional variations”*. The report further concluded that *“the proportion of secondary sets connected to set-top aerials varies more significantly....but a national value of 20% seems reasonable”*.

We have no reason to believe that the situation has changed significantly over the last three years, so we conclude that set-top reception remains an important way for households to access DTT services, even on their primary set. It is therefore important that the impact of any new service on DTT reception is fully understood.

We understand that Ofcom does not actively support reception using a set-top aerial but we remain firmly of the view that this is an important way for a significant minority of households to access DTT and it should therefore be given due consideration. In many cases these households have no option other than to use a set-top aerial and it is therefore helpful that some better-performing aerials were identified in Ofcom's tests although the test detail was not provided for us to determine the degree of improvement offered by these products. Ofcom should consider legitimate viewer expectations when assessing the level of consumer support that may be required and make due allowance for those households that rely on set-top reception with good reason.

We note that the Ofcom mobile terminal measurements for this Consultation were made on the basis of full resource block use, which is not the worst case scenario. The note on p23 of "*Dynamics of 3GPP LTE uplink: 800MHz DTT and LTE coexistence*" which was published in support of Ofcom's "Second consultation on coexistence of new services in the 800MHz band with digital terrestrial television" stated that "*time discontinuous transmission of LTE UE signals may lead to increases in the required protection ratio and thus separation distances*". We therefore believe that Ofcom should undertake a sensitivity analysis of this factor.

We further note that, for 800MHz co-existence, the worst interferer for set-top reception was identified as the base station, whereas for 700MHz, the dominant interferer will be the mobile terminal located in the same room as the set-top aerial. Filtering will not reduce the out-of-block emission, so this remains a concern.

We note that France is adopting a band plan based on the use of a 5MHz uplink block between 703 and 708 MHz. This offers the significant benefit of improving handset out-of-block performance from -42dBm/8MHz to approximately -57dBm/8MHz, and Germany have specified handset out-of-block performance to be -57dBm/8MHz. Clearly this will offer significantly greater protection to DTT than the -42dBm/8MHz currently expected, and we encourage Ofcom to review the regulatory actions of these administrations and adopt a similar approach when licensing 700MHz LTE in the UK.

#### Direct ingress to receivers

We agree that good receiver design and the use of a good quality receiving system will minimise the likelihood of direct signal ingress to receivers.

#### Impact of DTT on mobile services

We do not offer a view on this point.

#### Interference to cable TV

We do not offer a view on this point.

**Question 3** *Do you agree with our conclusions that DTT receiver filters will be the most effective mitigation technique for the 700MHz band and that group K aerials will also help to mitigate against 700MHz coexistence issues?*

### Filters

We agree that filters will have a role to play, but they are not a universal panacea and their use needs to be carefully managed. In particular:

- Any 700MHz interference mitigation programme needs to avoid the possibility of households inadvertently cascading 700MHz and 800MHz filters, thereby increasing the insertion loss and unnecessarily degrading the DTT reception margin
- The two Interim multiplexes will be moving to ch55 and ch56 as part of the 700MHz DTT clearance programme. While those multiplexes remain, the universal deployment of 700MHz low pass filters cannot take place otherwise consumers with such a filter would be denied access to those multiplexes. Any mitigation programme relying on the deployment of filters will need to be carefully managed to avoid the possibility of this occurring.
- In the case of set-top reception, we note that a filter can only address the risk of receiver overloading by a handset. Overloading due to Base station transmissions is unlikely to arise due to the attenuation provided by the fabric of the building, a factor referred to in the 800MHz co-existence consultation. A filter will do nothing to remove the out-of-block emissions from a handset which are potentially the dominant interference mechanism.

We are given to understand that, in the 800MHz mitigation programme, DMSL have resolved the vast majority of interference cases through improvements to the receiving system, rather than by the addition of a filter. This is helpful because these same households would be vulnerable to interference from a 700MHz LTE network and it reduces the likelihood of these households requiring a second visit or a replacement filter to restore reception. These solutions would also ensure that reception of the Interim Multiplexes would not be compromised by the mitigation employed.

### Aerial Group

There is a theoretical and practical aspect to aerial group recommendations:

The **theoretical** view is that Group K should be adopted as the new wideband aerial in areas where there is no prospect of channels above ch48 being used for DTT. This would clearly be beneficial since perpetuating the installation of antennas with good performance in the 700 and 800MHz bands in areas where this is unnecessary increases the likelihood of interference issues arising both now and in the future, and is best avoided. However, until such time as the future of the Interim multiplexes becomes clear, it remains appropriate to recommend the use of traditional wideband, or preferably Group T aerials in the areas where these multiplexes are available.

The **practical** view is that many installers do not, or may not wish to, carry stock of more than one aerial group. In addition, installers may not wish to concern themselves with the details of which multiplexes are available from any particular transmitter. The practical guidance would therefore be to continue to promote the

use of group T antennas as being a universal solution until such time as the Interim multiplexes cease to operate.

Digital UK always has and will continue to indicate the correct aerial group for a transmitter on material aimed at the trade and on the Predictive Coverage Database (PCD). In addition, where we give guidance on aerials, we will update the guidance to promote geographically appropriate use of Group K or Group T aerials.