

Telefónica UK's response to Ofcom's consultation:

Coexistence of new services in the 800 MHz band with digital terrestrial television

August 2011

Executive Summary

1. Telefónica UK Limited¹ welcomes this opportunity to respond to Ofcom's consultation on *"Coexistence of new services in the 800 MHz band with digital terrestrial television"*.
2. We further welcome Ofcom's recent commitment to Parliament to ensure that the costs and funding model for DTT mitigation are clear before commencing the Combined Award process. It is essential therefore, that Ofcom urgently investigates claims made by the BBC at the Stakeholder Event on 5th July that the scale of interference estimated by Ofcom may be significantly under-stated. Any disagreement between the BBC and Ofcom should be resolved as a matter of urgency so as not to delay the auction process.

Mitigation options

3. Telefónica UK recognises the potential risk of interference between LTE800 transmission and DTT and has been engaged with the industry for some time about its potential effect and possible mitigations. We agree with Ofcom's conclusion that filtering at the DTT receiver, or prior to the DTT amplifier if there is one, is the most effective means of mitigation. We also broadly agree with Ofcom's conclusion that BTS filtering will provide additional benefit in certain cases.
4. Platform changes and other bespoke solutions may also be required in some cases. We also support Ofcom's recommendation of improvements and alterations to DTT equipment and recommend a "4G ready" approval scheme to certify that new products have undergone testing against susceptibility to interference.
5. Telefónica UK does not believe any of the other options considered by Ofcom are feasible and/or credible.

Implementation

6. Ofcom's analysis shows that the deployment of DTT receiver filters and BTS filters would mitigate interference for 720k of the 750k DTT households estimated to be at risk of interference. The remaining 30k, mostly impacted by interference from Block A, would require platform changes and/or other bespoke solutions.
7. Where the BTS is in or close to a centre of population we believe there would be benefit from requiring that all 800MHz licensees achieve an ACLR greater than that specified in Commission Decision 2010/267/EU, either by better BTS performance or through the addition of a BTS filter. This would remove from the scope of "MitCo" costs of c£11m (Ofcom estimate) and also simplify its task as it would no longer need to consider "trade-offs" between network and consumer mitigations.
8. Telefónica UK agrees with Ofcom's assessment that a single body would be best placed to co-ordinate support to impacted DTT consumers, and that it should not be left to the licensees alone.
9. A pragmatic approach will be needed to determine the likely impact of new services in the 800MHz band ahead of their actual launch. We have suggested in this response that the first licensee to launch in an area should undertake a "sweep" of that area on all 800MHz channels

¹ Telefónica UK Limited trades under the O2 brand in the United Kingdom

(i.e. Blocks A, B and C) on those sites where it plans to deploy services. By transmitting from their cluster of sites on each of the spectrum blocks at pre-determined times, the licensee in question could co-ordinate activity with MitCo who would be able to communicate to potentially impacted DTT consumers about upcoming services and about eligibility for support in the event of interference.

10. For those customers who experience interference, MitCo's responsibility should be to provide cost-effective support as efficiently as possible. Any support provided should cover (only) the reasonable costs of mitigation and should be provided once only for each eligible household.

Costs and funding

11. Ofcom has stated that it will be conducting further work over the summer to consider the extent of consumer support that should be offered in the event of interference. The scope and nature of support to be provided may have a significant bearing on the costs of the scheme to support impacted DTT customers. However, Ofcom has stated that it regards the £100m estimate included in its report as being towards the top end of their expected range.
12. Of the total costs, £25m is the estimated cost of MitCo itself. Very little information is provided about the basis of this estimate; however, there will clearly be an onus on Government and Ofcom to ensure that MitCo discharges its obligations efficiently and effectively, and that the costs of MitCo are proportional to the benefit delivered. Telefónica UK believes the costs of establishing and running MitCo are best funded via the auction. This can be achieved by increasing the reserve prices of each Lot in the auction by c£4m; by removing the uncertainty for bidders about MitCo's costs, the total proceeds could be expected to be (at least) £25m higher than if the costs were recovered via other means, such as a levy on successful bidders.
13. As stated above, c£11m can be removed from the scope of MitCo by changing the licence obligations of licensees to include operation of base stations within a pre-determined ACLR under certain circumstances, to include fitting of BTS filters if necessary. This leaves c£64m (Ofcom's estimate) of which c£53m relates to DTT receiver filters and c£10m to platform and other bespoke changes, which are primarily attributable to Block A. These items could also be funded via the auction, although we note Ofcom proposes instead to use a "tariff".
14. The estimated cost of £10m for platform changes relates largely to interference from Block A of the 800MHz spectrum. There is merit in the costs of platform changes and other bespoke solutions being "borne" by the licensee for Block A, subject to:
 - a. Such approach being clearly stated in the auction rules, so that all bidders have the same ability to effectively price these costs into their bids; and
 - b. The primary round of the auction determining a generic price for an 800MHz lot, rather than conflating demand for lots and assignment of lots, as happens in the current process; and
 - c. The financial exposure being capped, such that it can be priced in.
15. If any of these "conditions" is not satisfied, any proposal to impose differential charges on successful licensees would lack legitimacy and the costs should instead be spread across all blocks.

16. However, if these conditions are satisfied, the successful licensee could be asked to pay the estimated cost of £10m associated with such mitigations alongside the cost of the licence. As a result, the scope of the tariff mechanism would be restricted to the costs of DTT receiver filters.
17. Finally, Telefónica UK believes that Ofcom is required to apply similar principles to the costs of DTT mitigation as were applied to the Digital Switchover Help Scheme, the financial impact of which on the BBC was clearly identified, ring-fenced and effectively capped. We expect public bodies to take a symmetric approach to risk, irrespective of whether the risks apply to broadcasters or mobile network operators.

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The interference effect

18. We recognise the potential risk of interference between new services in the 800 MHz band and digital terrestrial television (“DTT”) and have been engaged with discussions in the industry for some time about this effect and how it can be assessed ahead of the auction of 800 MHz spectrum.
19. The technical work that Ofcom commissioned, and on which it has reported in this consultation, to understand the scale and nature of the coexistence issue has concluded²:
- “there is a significant risk of interference from new services ... to some existing DTT users. This risk primarily relates to transmissions from base stations operated by new licensees in the lower part of the 800 MHz band being picked up by some existing DTT receivers in the adjacent band.”*
20. The risk has been assessed by extrapolating the results from a computer simulation of the impact on three different types of aerial installation – a standard domestic installation, communal aerial installations and domestic installations with an amplifier – using the Oxford DTT transmitter coverage area, and then extrapolating the results across the rest of the UK. This has been supplemented by a field trial conducted in Tamworth³ and a supporting review of communal aerial systems⁴.
21. Between the publication of Ofcom’s consultation on 2nd June 2011, and the publication of the associated technical report on 10th June, there was some minor refinement of the results of the study, the most up to date of which are repeated here for reference:

Table 1 Estimated number of UK households affected absent any mitigation⁵

	Standard installations	Communal aerial systems	Domestic installations with amplifiers	Total
No. of affected households	115,212	521,619	115,058	751,889

22. There is an inevitable risk that the actual impact could be very different from that estimated by Ofcom and its advisers, both at the overall level in terms of the number of households affected, and by category of TV and aerial installation. Ofcom has recognised this risk in its modelling⁶:

“In view of this uncertainty, we have generally adopted a worst case approach in our modelling. For example, in modelling standard domestic installations, we have used the

² §4.4

³ Summarised in *Field Trial – Coexistence with DTT* presented at Ofcom’s stakeholder Workshop on 5th July 2011 by Aegis Spectrum Engineering

⁴ *The Impact of LTE on Communal Aerial Systems – A Short study for Ofcom*, Issue 1.1, 6th June 2011, ManderCoM

⁵ Table at §1.8, *Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*, Ofcom, 10th June 2011

⁶ §4.44

worst performance contour of the tested DTT receivers as the basis of our analysis. We expect that the numbers presented are more towards the upper end of the range of estimates. The numbers of households affected in reality may be lower than those presented here.”

23. At the Stakeholder Event on 5th July 2011 the BBC suggested, based on work they had undertaken to validate Ofcom’s analysis, that Ofcom’s assessment may significantly *under*-state the impact of interference. One issue raised by the BBC concerned the apparent inconsistency between the assumption made in Ofcom’s technical report that each base station would radiate at a nominal 59dBm per 10MHz channel and the 61dBm per 5MHz channel (equivalent to 64dBm per 10 MHz channel) in-block emissions limit proposed in Ofcom’s separate consultation on Technical Licence Conditions (“TLCs”)⁷. Telefónica UK does not believe there is an inconsistency between the two documents, given that the consultation on TLCs proposes a **limit** rather than an absolute level.
24. Of course, if any party attempted to replicate Ofcom’s assessment of the number of DTT households likely to be impacted by interference using the 64 dBm limit or maximum, the results obtained will differ from those obtained by Ofcom. However, we do not believe such an assessment would be representative as it would disregard experience with traditional 900MHz 2G macrocells where 59dBm is typical given antenna gains at this frequency range.
25. Whilst the BBC’s comments might be seen in some quarters as an attempt to undermine Ofcom’s approach to the question of DTT interference, we would ask that Ofcom and the BBC jointly review the latter’s work, with a view to determining whether Ofcom’s assessment is reasonable. In the event Ofcom believes it needs to revise its figures, any updates should be released – along with any updates to dependent figures, such as estimated costs - to all parties with an interest in the interference issue to ensure that all stakeholders work with a common set of assumptions.
26. Ofcom has committed to Parliament that it will not begin the Combined Award until there is a decision on the mitigation of interference⁸:

“The proposals to address the risk of digital terrestrial interference are out for consultation at the moment and it is very important that we conclude that before the auction so that everybody knows where they stand.”
27. Therefore, a review of the BBC’s claims should be undertaken as a matter of urgency, in order to avoid any disagreement between Ofcom and the BBC potentially delaying the auction process.
28. In terms of the methodology used by Ofcom, the only comment we would make relates to assumptions around the extent to which the 800MHz licensees will share sites. Whilst we believe that Ofcom’s estimation of 9,000 BTS sites per 800MHz operator seems sensible⁹ for the

⁷ Consultation and information on technical licence conditions for 800 MHz and 2.6 GHz spectrum and related matters, Ofcom, 2nd June 2011

⁸ House of Commons Select Committee on Culture, Media and Sport; uncorrected oral evidence 5th July 2011

⁹ Telefónica UK expects the propagation characteristics of 800MHz spectrum to be similar to 900MHz spectrum and would therefore expect the deployment of 800MHz to mirror 900MHz GSM services at approximately 9,000 sites, as Ofcom has noted in the Technical Report. Deploying 800MHz services on many more sites than this would result in significant operational challenges when optimising neighbouring sites in the urban centres and effectively “forfeits” any coverage gains provided by the use of lower band spectrum.

purposes of its study, the assumption that there will be full site sharing – i.e. 27,000 base stations on the same 9,000 sites – is not realistic, nor does it reflect experience to date with the roll out of 2G and 3G services.

29. We recognise that from a cost recovery perspective, full site sharing is, in a sense, the “worst case scenario” in terms of the cost to be recovered per site; however, we think there are other ways to address what appears to be a working capital issue for MitCo.

Mitigation options

30. We set out below our views on the mitigation options identified and assessed by Ofcom.

Filtering at the DTT receiver (“DTT receiver filtering”).

31. Telefónica UK agrees with Ofcom’s conclusion that filtering at the DTT receiver (or prior to the DTT amplifier if one is installed) is the most effective way of mitigating the impact of interference from LTE800 MFCN base stations.
32. A similar situation is currently being addressed between the GSM900/UMTS900 and GSM-R operators. In this case receiver blocking has been shown by Ofcom¹⁰ to be the predominant interference mechanism and that the fitting of receiver filters at the GSM-R receiver mitigates the majority of interference impacts on the GSM-R system.
33. Telefónica UK does not have visibility of the cost per unit for DTT receiver filters, but recognise - as Ofcom has done - that in some instances the associated costs of installation would be much higher than the cost of the filter itself.

Filtering at the base station transmitter (“Base station transmit filtering”)

34. Telefónica UK broadly agrees with Ofcom’s conclusion that LTE800 BTS filtering beyond that specified in Commission Decision 2010/267/EU will provide additional benefit in certain cases (for protection of channels 59 and 60) where DTT receiver filters have been deployed and BTS Out of Band (OOB) emissions are the limiting factor rather than blocking.
35. We would not expect all base station locations to cause OOB interference with DTT due to their geographic location. However, where the base station is in or close to a centre of population we believe there would be benefit from requiring that the 800MHz licensees achieve an ACLR greater than that specified in the Commission Decision, either by better BTS performance or through the addition of a BTS filter.
36. It would be inefficient for licensees to pay MitCo the estimated £11m cost of BTS filters, only to then be recipients of those funds. Our preference would be for the target ACLR in Channel 60 to be included in the 800MHz Technical Licence Conditions. This will place the correct economic incentives on the operator, to minimise the cost of compliance. In our view, the use of MitCo as an intermediary would add inefficiency and may dilute these incentives, as we believe Ofcom recognises¹¹.
37. To the extent that the costs fall differently between BTS’s operating in Blocks A-C, it is vitally important that the auction design allows the assignment round of the 800MHz spectrum to allow bidders to effectively express the differential costs of mitigation.

Improvements and alterations to DTT equipment

38. Telefónica UK fully supports Ofcom’s recommendation of improvements and alterations to DTT equipment. It has been known by all parties since the start of the Digital Switchover (“DSO”) process that the upper part of the DTT spectrum would eventually be used for services other

¹⁰ *UMTS900-GSM-R Interference Measurements, A Report Prepared for Ofcom, Andrew Barnard, Red-M, 20th June 2011*

¹¹ §6.53, first bullet

than DTT. Manufacturers of TVs and ancillary equipment have had knowledge of the exact band in which these services would be deployed since Commission Decision 2010/267/EU if not earlier, and therefore have had some considerable time to react to the possibility of coexistence requirements with adjacent non-DTT services in the 800MHz band.

39. Just as Telefónica UK plans for the future, for example by deploying antennas capable of +/-45° cross-polarised 800MHz/2600MHz operation from 2010 onwards in readiness for the potential deployment of LTE from 2012 onwards, we would hope TV and ancillary manufacturers have been taking steps to prepare for the deployment for LTE800 services, although we note that there remains the incentive for some manufacturers to sell one product to a consumer in 2011 and then a replacement in 2012.
40. In order to remove that incentive, we would recommend a “4G ready” approval scheme to certify that a product had undergone testing against susceptibility to interference from new 4G services in the 800MHz band, similar to the “HD Ready” initiative that we have seen from many of the TV manufacturers in recent years. However, if such a scheme were implemented, it should perhaps be more rigorous and forward-looking than the “HD Ready” certification initiative introduced in 2005, which struggled to clearly differentiate between different forms of HD readiness (e.g. 720 HD, Full 1080 HD) or to communicate to consumers the real meaning of HD readiness (e.g. in many instances the built in receiver included in the “HD Ready” TV did not support the DVB-T2 standard required to receive HD pictures in the first place, which meant that many consumers had to purchase additional “HD Ready” equipment).
41. Another example of where alterations to existing DTT receivers may result in less interference from LTE800 systems was highlighted by the BBC and Sony during the joint testing undertaken with Telefónica UK in August 2010¹². During the testing it was observed that for some DTT receivers the DTT receiver’s Automatic Gain Control (AGC) tracking of the LTE signal caused the DTT reception to fail and that slower AGC tracking could potentially mitigate the interference seen by some DTT receivers. AGC is typically controlled via the DTT receiver’s firmware and therefore in some cases a simple firmware update could be enough to mitigate interference from LTE800 completely. Updating the firmware of existing product could be made an obligation for a manufacturer seeking “4G ready” certification for its future product portfolio.

Re-orientating DTT aerials

42. Whilst Telefónica UK accepts that the re-orientation of DTT aerials towards a second DTT transmitter is a possible mitigation, an alternative option for some DTT aerial installations would be to relocate the DTT antenna in an area of shadowing from the LTE800 BTS. For example on the opposite side of the chimney stack. This would have the added benefit of retaining the existing regional programming for the impacted household.
43. Re-orientation may also be an easier option than installing additional attenuators where blocking is the primary interference mechanism in an area of good DTT coverage leading to the need to reduce both the DTT signal and the LTE800 interfering signal¹³.

¹² *LTE 800MHz compatibility tests with DTT Receivers* September 2010, Report Version: 1.0a

¹³ As set out in *OFCOM Coexistence Workshop Technical Slides 2011-07-05*, slide 15

Opposite to DTT polarisation

44. A number of studies¹⁴ have shown that cross-polar diversity in the uplink does not provide the same level of diversity gain as vertically polarised antennas spaced some wavelengths apart (typically 20 wavelengths to achieve sufficient decorrelation), and that a +/-45° polarised wave does not propagate as far in the downlink as a vertically polarised wave in an urban or suburban environment with a propagation loss over vertical polarisation of around 3dB¹⁵.
45. However, despite this, for many years now mobile operators have deployed mainly cross-polar (+/- 45°) antennas in all environments due to space and lease limitations, and for environmental reasons.
46. One obvious reason why vertical polarisation combined with space diversity is not practical as a mitigation technique or even for general deployment is the horizontal separation required to achieve a diversity gain (at 800MHz 20 wavelengths = 7.5m). This is clearly not possible on a low impact BTS lamppost site in the middle of a suburban housing estate or even on a six sector roof top site in Central London, and moving the vertical antennas closer together would lead to less of a diversity gain than that provided by cross-polarised antennas.
47. Finally, across the industry, many operators currently plan to share a common cross-polar antenna for both 800MHz and 900MHz operations. In the UK, both Telefónica and Vodafone are in the process of deploying such antennas, which have been available for some time from a number of antenna vendors (e.g. Kathrein, Argus and Andrews). Having a dedicated antenna for LTE800 in addition to antennas already deployed on sites for GSM900, UMTS900, GSM1800, UMTS2100, and LTE2600 will not always be possible, and even if it is possible could lead to significant increases in BTS site rental costs.
48. With regard to horizontal polarisation, studies¹⁶ suggest there can be a significant reduction (6dB) in propagation in urban and suburban environments and in one practical study the difference in the uplink observed between the vertical and horizontal branches was between 8-11dB¹⁷. Such a loss in both uplink and downlink would, clearly, require many more additional LTE800 BTS sites if horizontal polarisation was required in areas covered by DTT relay stations which would not be cost effective and would undermine existing operators' efforts to minimise the environmental impact of their respective networks.
49. Telefónica UK does not know of any antenna manufacturer that produces horizontally polarised BTS antennas for the cellular frequency bands.
50. In addition to this the results seen during Ofcom's Tamworth DTT trial appear inconclusive as to the actual cross-polar discrimination achieved by a typical DTT standard aerial.

¹⁴ See for example: (1) *A Study into the use of Polarisation Diversity in a dual band 900/1800MHz GSM network in Urban and Suburban Environments*, Joyce, R. et al., 1999 IEE National Conference on Antenna and Propagation; (2) *Base Station Polarization Diversity Reception for Mobile Radio*, Kozono, S. et al., IEEE Transactions on Vehicular Technology, Vol. VT-33, No. 4, pp.301-306, 1984; (3) *An Experimental Evaluation of the Performance of Two-Branch Space and Polarization Diversity Schemes at 1800MHz*, IEEE Transactions on Vehicular Technology, Vol. VT-44, No. 2, pp.318-326, 1995

¹⁵ *The Mobile Radio Propagation Channel*, Parsons, J. D. , 2nd Edition

¹⁶ See *The Mobile Radio Propagation Channel*, Parsons, J. D. , 2nd Edition

¹⁷ *A Study into the use of Polarisation Diversity in a dual band 900/1800MHz GSM network in Urban and Suburban Environments*, Joyce, R. et al., 1999 IEE National Conference on Antenna and Propagation

51. For these reasons Telefónica UK does not support opposite to DTT polarisation as a credible mitigation technique.

On Channel Repeaters (“OCRs”)

52. As stated in Ofcom’s technical report the viability of OCRs as a universal mitigation tool remains uncertain. Telefónica UK agrees with this assessment.

53. As stated in the technical report¹⁸, if the LTE800 BTS EIRP is 59dBm, then a received DTT signal level of -54dBm would be required at the input to the OCR for successful operation and it is estimated in the report that this could not be achieved at 30% of BTS locations in the coverage area of the Oxford transmitter. Given the Technical Licence conditions currently specify a maximum EIRP of 64dBm/10MHz then according to the method presented in the technical report this would imply a required DTT signal level of -49dBm at the OCR, a median planning signal strength of -40dBm (margin of 1.65 σ) and reading from Figure 34 of the Technical Report this would lead to 40% of BTS locations not being able to receive an adequate DTT signal for OCR operation.

54. The technical report also assumes that the OCR would share the BTS antenna, but as stated earlier neither vertical nor horizontal polarisation are viable alternatives for LTE800; therefore, if the DTT signal was transmitted on +/-45° polarisation rather than vertical or horizontal polarisation then a further reduction in the wanted DTT signal would be seen at the DTT receiver.

55. On the issue of coupling loss, an isolation of 80dB between the OCR donor and transmitting antennas seems very challenging to Telefónica UK given our past experiences with 3G repeaters. To achieve an isolation of 80dB with antennas back-to-back as was done in the Ofcom Tamworth trial is one thing, however achieving this with the OCR repeated signal being transmitted out of three or potentially six antennas per site seem very challenging indeed.

56. Finally on the subject of aesthetics, many of Telefónica UK’s BTS sites located close to populated areas have been designed to look like lamp posts, telegraph poles or other structures commonly found in these environments. Adding a Yagi antenna as the donor OCR antenna to these structures as depicted in Figure 30 of the Technical Report is likely to cause a number of issues, including:

- a. The addition of a Yagi antenna will greatly reduce the effectiveness of current designs which are intended to minimise the environmental impact of BTS sites.
- b. Councils might be more reluctant to grant planning permission to new sites of this type if they now have an extra appendage hanging off the side.
- c. Landlords may seek to renegotiate the terms of the lease to allow for an additional antenna, potentially resulting in significant increases in BTS site rental costs on those sites where OCRs were deployed.

57. For the above reasons Telefónica UK does not see OCRs as an effective mitigation measure.

¹⁸ §6.127a, *Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*, Ofcom, 10th June 2011

Base Station power reductions

58. Given the similar propagation characteristics of the 800MHz and 900MHz frequency bands we would expect that LTE800 networks are likely to be deployed initially on a similar grid to existing GSM/UMTS900 networks. Therefore, to provide a similar network coverage footprint the transmit power of the 800MHz BTS will need to be equal to that of the 900MHz network (assuming similar antenna gains/cable losses for both networks). Any reduction in the allowed 800MHz EIRP will lead to a reduced 800MHz coverage when compared to a 900MHz network deployed on a similar grid. In order to compensate for this, the 800MHz network operator would need to deploy further 800MHz bases stations resulting in more 800MHz base stations closer to populated areas (further increasing the risk of interference between LTE800 and DTT services) and additional cost to the 800MHz deployment.
59. As shown by testing carried out by the BBC, Sony and Telefónica UK¹⁹, and as mentioned in the Technical Report (A6.16), the LTE “idle” bursty signal caused far more interference than the “loaded” LTE signal. Reducing the BTS’s power would lead to a smaller coverage area per cell, fewer users per sector and therefore a higher probability of the BTS being “idle” rather than “loaded”. Consequently, reducing the LTE800 BTS power may actually *increase* the interference seen by DTT users rather than reduce it. Telefónica UK would be interested in Ofcom’s views on this effect and whether their simulations can model this effect.

¹⁹ LTE 800MHz compatibility tests with DTT Receivers September 2010, Report Version: 1.0a

Implementation

Consumer support

60. We note that Ofcom will be conducting further work over the summer to consider the extent of consumer support that should be offered and look forward to participating further in those discussions. The precise policy proposals from Ofcom regarding the type and extent of any mitigation that should be offered to impacted DTT users could have a significant bearing on the likely costs of any support, and on the potential complexity of running the support scheme. In the absence of any detail, our comments below are focused on the mechanics of any scheme that Ofcom might choose to implement.
61. Ofcom’s assessment of the various mitigation options identified suggests that with filtering of both DTT receivers and at base stations, interference can be mitigated for all but approximately 30k of the 750k households that Ofcom estimates might be impacted. This is summarised below.

Table 2 Estimated number of UK households affected with base station and DTT receiver filtering²⁰

	Number of households affected due to interference, by Block				
	A/B/C	B/C	C	B	A
Standard domestic installations	23,167	1,150	144	1,017	22,463
Communal aerial systems	44	1	0	1	41
Domestic installations with amplifier	7,405	411	31	373	6,961
TOTAL	30,616	1,562	175	1,391	29,465

62. Clearly, the vast majority of residual impacts relates to Block A of the 800MHz spectrum that Ofcom proposes to auction. Resolution of any interference issues for these households would be via platform changes and other bespoke solutions.
63. We welcome Ofcom’s statement to Parliament that it will ensure that the costs and funding model for DTT mitigation are clear, before commencing the Combined Award process. If the costs of mitigation are to fall substantially on Block A, then Ofcom will need to have a strong objectively justified case for any measures that preferentially assign Blocks B and C to one class of bidders and distort Telefónica UK and Vodafone UK’s bidding activity towards Block A. As Ofcom will now know, it does not have a fact-based case to discriminate against Telefónica UK based on the objective justification for the “spectrum floors” competition remedy included in the March 2011 consultation.

²⁰ Tables 27, 33 and 38, *Technical analysis of interference from mobile network base stations in the 800 MHz band to digital terrestrial television*, Ofcom, 10th June 2011

64. Unfortunately, a conclusion on the mitigation funding model is constrained by decisions pertaining to the auction rules.
65. We believe that any scheme established to provide support to impacted DTT consumers will need to take into account the following:
- a. The costs of administering any consumer support need to be considered alongside the (perceived) benefits – the costs should be proportional.
 - b. Any support should be provided once to each address – if the occupants subsequently move and take with them equipment such as filters provided by MitCo, MitCo should not be required to replace that equipment for the new occupant.
 - c. The scheme should only be responsible for incurring or contributing towards the *reasonable* costs of putting right any interference directly attributable to new services in the 800MHz band – it should not incur the costs of making good existing issues with DTT reception. For example, the ManderCoM report²¹ into the potential impact on communal aerial systems noted that some systems have been fitted on a “fit and forget basis with no maintenance programme in place”. The same report also comments on the variable quality of antennas and wiring in such systems. Clearly, any support offered via MitCo should not pick up the costs of rectifying such issues.
 - d. The support provided should take into account the differing needs of households – some households, for example, may be able to self-install DTT receiver filters, whereas others may need additional support. The scheme should take this into account and set out clear rules that apply to different groups where appropriate.
 - e. The rules for providing support should also be clear about the extent of support to be offered. We note, for example, that the Digital Switchover Help Scheme (“DSHS”) is committed to converting to digital only one TV per eligible individual.
 - f. Certainty for prospective bidders in the auction – open ended commitments would have a significant negative impact on bidding behaviour and potentially undermine Ofcom’s broader objectives for the auction. We cover this further below.
 - g. Any scheme needs to be pragmatic and workable.
66. There are a number of more detailed practical issues that the scheme would need to take into account. Some of these have already been considered in connection with the DSHS²², but are probably too detailed for this stage of Ofcom’s consultation.

Network-based mitigation

67. Although the incremental benefits of base station filtering have been revised downwards in the technical report issued shortly after the consultation document, we would support the installation of base station filters for operation of base stations within a pre-determined ACLR as a licence requirement under certain circumstances (to be determined based, perhaps, on

²¹ *The Impact of LTE on Communal Aerial Systems – A Short study for Ofcom*, Issue 1.1, 6th June 2011, ManderCoM

²² See for example, *The Digital Switchover Help Scheme – A Scheme Agreement Between Her Majesty’s Secretary of State for Culture, Media and Sport and the British Broadcasting Corporation*, 4 May 2007 and helpscheme.co.uk

proximity to built up areas). We believe this might be easier to implement than allowing licensees to determine on a site-by-site basis whether or not they comply with the ACLR standard.

68. We believe that this approach could help to simplify MitCo's task, and it would reduce the risk of operators potentially having to fit base station filters retrospectively.
69. Using Ofcom's figures, adopting this approach would remove an estimated £11m from the scope of MitCo and reduce the total estimated cost under MitCo's influence to £89m from £100m²³. The licensees would bear the risk that the total cost over time of complying with the proposed standard, whether compliance required filters or not, exceeded £11m.

Non-cash costs

70. Ofcom stated at the stakeholder workshop that their total estimate of costs does not include an estimate of the non-cash costs that might occur as a result of interference. Although we recognise that the deployment of 800MHz services might result in the temporary loss of service for some DTT customers, we believe that it would be difficult to value such non-cash costs objectively. As such we would not support the inclusion of non-cash costs in Ofcom's proposed tariff mechanism.

Delivery mechanisms - MitCo

71. Telefónica UK agrees with Ofcom's assessment that a single body would be best placed to manage consumer-based mitigations and to co-ordinate any activity with impacted DTT consumers. We also concur with Ofcom's assessment that this should not be left to the licensees to resolve, especially because any co-ordination activity would require the sharing of competition-sensitive information relating to each licensee's proposed roll-out plans.
72. The roll out of new services using the 800 MHz spectrum will – unlike DSO - be determined by each licensee's view of the commercial opportunity, rather than a pre-defined programme of activity with a set end date. Also unlike DSO, the roll out plans of the successful licensees will be *independently* determined (and amended to reflect the success of commercial offerings) so although we might expect similar network coverage to be achieved over time, in the short term each licensee will determine a roll out strategy that it believes is most appropriate.
73. A pragmatic approach is therefore needed to determine the likely impact of new services in the 800MHz band in advance of their actual launch. One approach to this would be to require, as part of the 800MHz licensees' co-ordination obligations, that the first licensee to launch 800MHz services in an area should undertake some testing to help MitCo to determine which households can be expected to be impacted. The precise details of how this might be done would need to be worked through in more detail, however at a high level it would require the first mover in an area to work closely with MitCo ahead of commercial launch to "sweep" the area on *all* LTE 800MHz channels on those sites which it plans to deploy i.e. on all six lots. This could be done by

²³ Table 5.7, §5.106

transmitting from their cluster of sites on each of the spectrum blocks at pre-assigned times²⁴.

For example:

- a. 8.00-8.10pm Block A
- b. 8.20-8.30pm Block B
- c. 8.40-8.50pm Block C

74. This could be repeated regularly over a set period prior to the planned launch by the first mover. Impacted individuals, or landlords on behalf of households dependent on communal aerial systems, would then declare to MitCo (via a freephone number, pre advertised in the locality) any impact, which MitCo would be responsible for validating. MitCo would then be responsible for identifying the most cost effective mitigation for those people affected.
75. Also given the set timings of the regular transmissions it would be quite clear which block was responsible for causing the interference.
76. In this way, an area can be screened once without the need for unnecessary flows of confidential information to MitCo. Each operator would send its forward coverage plan to MitCo and MitCo would then identify to the operator in which area(s) it was “first mover” and if not, what mitigation would be required for the block licensed to that operator.

Administration costs and efficiency

77. With regard to the costs of MitCo itself (est. £25m) very little information has been provided about how these have been built up or of the expected “shelf-life” of MitCo. There will clearly be an onus on Government and Ofcom to review on an ongoing basis whether MitCo is discharging its obligations efficiently and cost effectively, and also whether its role remains relevant and is proportional. MitCo will need to “flex” certain activities to reflect the independent roll out plans of the licensees, as a result of which we believe that the fixed costs of MitCo should be minimised and any activities that are driven largely by the volume of activity for which MitCo has responsibility should be tendered on a regular basis to drive value for money.
78. One possible mechanism to drive efficiency would be for Government to invest some of the auction receipts into the operation of MitCo, such that it also had an interest in ensuring efficient operation. That £25m could be raised by increasing the reserve prices for each of Lots 1-6 by c£4m. MitCo could then draw down on this £25m and standard contract management practices between Government and its suppliers would ensure that value for money was achieved.

Funding and Ofcom’s proposed tariff mechanism

79. Ofcom states that one of its objectives is to provide certainty to prospective 800 MHz licensees ahead of the auction so that they can “*factor into their decisions the costs implied for others of*

²⁴ Based on the results presented in Ofcom’s Technical Report, which suggest that some households are at risk of interference from more than one frequency, rather than it being a cumulative effect (it appears that the number of households affected by ABC transmissions is a subset of those affected by A, B or C rather than there being incremental households affected) Telefónica UK does not believe it would be necessary to transmit combinations of frequencies e.g. all of Blocks A, B and C simultaneously.

their choices”²⁵. We welcome Ofcom’s efforts in this area, and support their aim to confirm the way forward by the autumn.

80. Providing certainty on the potential cost implications is a key requirement for the auction process. In this regard, Telefónica UK notes Ofcom’s position²⁶:

“Although there is some uncertainty around the costs of our proposed mitigation measures, we consider that it is useful to provide an illustration of the possible costs of implementing our preferred mitigation measures. We have tended towards the pessimistic side and these costs should be interpreted as towards the upper end of our expected range rather than a “best estimate”.”

81. This is consistent with Ofcom’s view that they have adopted a worst case approach to the modelling of potential interference. Ofcom further believes²⁷:

“... that it is appropriate to seek to recoup costs, to the extent that they are predictable and controllable, from new licensees.”

82. To that end, it has proposed the use of a tariff mechanism to fund the costs of mitigation, possibly supplemented by a lump sum payment from each new licensee to fund certain costs that are fixed such as the costs of MitCo itself.
83. As Ofcom recognises, however, the use of a tariff mechanism can’t be relied upon to help licensees make the right choices in all cases. Hence, our earlier suggestion to include in the technical licence conditions a requirement for certain base stations to comply with a certain ACLR either by design or through the addition of a filter. With this change, the primary purpose of a tariff would then be to recoup the costs related to other forms of mitigation. The estimated costs associated with these other forms of mitigation are c£53m for DTT receiver filters, including installation, and c£10m for platform changes.
84. The latter relates to c30k households requiring mitigations other than DTT receiver and base station filters and as shown in Table 2 relates largely to interference from Block A of the 800MHz spectrum. At first sight, there is merit in the costs of platform changes and other bespoke solutions being “borne” by the licensee for Block A. However, whether this is an appropriate and/or equitable approach is dependent on a number of related items, in particular:
- a. Is the auction design, and the assignment round in particular, efficient?
 - i. Do all bidders have equal opportunity to win Lots 1-6? If not, any approach that tried to differentiate charges by Block would disadvantage any potential bidders who are “steered” towards Block A as a result of the auction design.
 - ii. Does the assignment round allow bidders to express their willingness to pay for the specific location of the spectrum they require relative to other bidders? As we have already stated in our response to Ofcom’s consultation on the Combined Award, if this element is not reflected in the auction design, the resulting allocation of spectrum between the winning bidders could be

²⁵ §6.32

²⁶ §5.101

²⁷ §6.53

inefficient²⁸, especially in circumstances where Ofcom is relying on network sharing to minimise regulatory risk²⁹. The current approach, with heterogeneous 800MHz lots in the primary stage conflates the expression of demand for 800MHz lots with the expression of preferences for assignment of those lots. In these circumstances it may be hard to “price in” the value of one lot type distinct from the value of the number of 800MHz lots desired.

- b. Is the financial exposure capped?
 - i. If so, bidders for Block A would all have the same ability to effectively price these costs into their respective bids.
 - ii. If not, the potential liability cannot be accurately priced into bids.

85. If the response to either of these questions is negative, any proposal to impose differential charges on successful licensees would lack legitimacy and the costs should instead be spread across all blocks. However, if responses are positive, the successful licensee for Block A could be asked to pay the estimated cost of £10m associated with such mitigations alongside the cost of the licence. This is summarised in Figure 1.

Figure 1 Treatment of costs of platform changes (Ofcom est £10m)

Can bidders express the value of assignment distinct from volume of spectrum required, unaffected by preferential allocation to one class of bidders?

		Yes	No
Is the financial exposure capped?	Yes	Costs can be factored into bids - winning bidder of Block A to bear costs of platform changes	Costs spread equally across all blocks
	No	Costs spread equally across all blocks	Costs spread equally across all blocks

86. From the licensees’ perspective, the costs of MitCo are uncertain. As stated above, we consider that the best way of providing certainty ahead of the auction would be to fund MitCo directly from the auction receipts, rather than via a fixed annual charge. To the extent that this is declared up front, Ofcom can expect the bidders to bid more than would otherwise be the case.

²⁸ §269, *Telefónica UK’s response to assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*, May 2011

²⁹ See §6.107, *Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues – Annex 6 Competition Assessment*, Ofcom, 22nd March 2011

87. Of course the same approach could be applied to all the other mitigation costs as well.
88. However, if Ofcom determines that a tariff is the way forward, we would offer the following comments:
- a. It should be clear which costs are covered by the tariff, and which are not
 - b. In order to avoid unnecessary debate, the basis on which any tariff is established should be transparent
 - c. It should be clear how, if at all, the tariff would be reviewed over time – to be clear, we would expect the tariff to recover no more than Ofcom’s reasonable estimate of costs which, based on the information provided and our suggested approach to other costs, we would limit to DTT receiver filters and potentially (subject to the assignment rules in the Combined Award) platform changes. The costs to be recovered are subject to policy decisions about the nature and scope of support to be offered
 - d. The tariff should be published before the auction to provide certainty to prospective bidders for 800MHz – we believe that a charge per base station³⁰ with a reconciliation in the event that actual costs are lower than Ofcom’s estimated costs is likely to be the most workable in this timeframe.
89. We note that Ofcom proposes to consult further on the potential tariff mechanism and we look forward to participating further at the appropriate time.

Under- or over-recovery of costs

90. Regardless of whether or not a tariff is used, we expect Ofcom to provide a reasonable degree of certainty about potential costs ahead of the auction, so that prospective bidders can take those costs into account. If Ofcom needs to conduct a sensitivity analysis to do this, and/or review whether its estimates of the number of households impacted is reasonable, it should undertake the relevant work as a matter of urgency.
91. In the absence of certainty, it is difficult to see how potential licensees can factor these costs into their business models when working out the value of the spectrum being auctioned. As a result, the number of bidders for 800MHz spectrum may be significantly reduced along with the proceeds. Block A, in particular, might be viewed with particular caution by potential bidders and we state again that discrimination in the award mechanism would mean that such uncertainty affected different bidders asymmetrically, compounding the regulatory failure in the proposed “spectrum floors” remedy.
92. Telefónica UK believes that the same basic principles should be applied to the scope and costs of MitCo as were applied to the DSHS, in particular:
- a. The estimated costs of the scheme should be ring-fenced (regardless of how they are funded)

³⁰ The charge per base station is dependent on the number of base stations expected to be deployed. A total of 27,000 base stations between the 3 licensees would equate to a per base station charge of between c£2,000 and c£2,400 assuming costs of either £53m or £64m in scope. Spectrum sharing which Ofcom considers in Annex 6, §6.107 of its “*Consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*” could result in fewer base stations overall, and a higher required tariff per base station. Ofcom will need to consider how to allow for this in its calculation of the tariff.

- b. In the event that there is expected to be a cost over-run, either
 - i. the mechanism for funding such an over-run should be determined at the appropriate time, but such funding should not be at the expense of the licensees' other activities, services or other resources; or
 - ii. measures should be taken to reduce the expected cost of the scheme in order to keep spend within the ring-fenced amount

93. We do not believe, as has been suggested in some quarters, that licensees can reasonably be expected to roll out 800MHz services while accepting a potentially open-ended financial commitment to meet the costs of addressing potential interference with DTT. In this regard, we believe that the telecoms sector should be treated no differently from the broadcast sector, in line with Ofcom's duties under Section 3(3) of the 2003 Act.³¹

Proposed licence conditions

94. Ofcom has suggested that a number of licence conditions might be appropriate to help support the work of MitCo, including the following³²:

- a. *"Tighter out of block emission levels in certain geographic areas (areas to be defined)*
- b. *Requirement for new licensees to make payments direct to MitCo in line with the tariff mechanism proposal*
- c. *Requirement to provide MitCo with full details of planned network and base station deployment in advance of actual network roll-out (time period to be defined). Licensees may also be required to provide further information not contemplated at the time of the award as required*
- d. *Requirement for licensees to cooperate with MitCo in ways necessary for MitCo to accomplish its work*
- e. *Requirement for new licensees to seek Ofcom's approval before establishing base stations in certain areas (areas to be defined)*
- f. *General requirement for new licensees to comply with any additional direction that Ofcom may provide*
- g. *Possible requirement to allow MitCo access to a licensees base station to fit an OCR*
- h. *Possible requirement to set tighter in block levels in certain areas (areas to be defined)"*

95. In the absence of a clearly stated policy in relation to possible interference issues, it is difficult to comment on the proposed measures, other than at a general level. However, as previously stated, any obligations placed on the 800MHz licensees must be proportional and bounded. Any open ended obligations would serve simply to deter parties from bidding, or encourage bidders to adopt a cautious approach to risk. This is perhaps most likely if loosely worded licence conditions are open to manipulation by other parties with special interests who may not take into account the wider economic benefits of mobile broadband services. Worse still, if the measures proposed are not proportional, their imposition on licensees could lead to a fractured

³¹ *"transparency, accountability, proportionality and consistency"*

³² Verbatim from slide 22 of *Coexistence with DTT workshop*, 5th July 2011

deployment of 800MHz, and consequent delays in the provision of the mobile broadband and other services.

96. Telefónica UK believes that it would be more appropriate to include appropriate obligations in revised co-ordination obligations, which could include the additional obligation we have proposed for the first licensee to deploy 800MHz in an area to conduct a “sweep” of that area using all the 800 MHz frequencies, rather than by amending licence conditions.