Bringing it all together

Issue 1

BT response to the Ofcom consultation on

Securing long term benefits from scarce spectrum resources – a strategy for UHF bands IV and V

Submitted to Ofcom on1 June 2012

Executive Summary

1. BT welcomes the opportunity to respond to Ofcom's consultation on a long-term strategy for UHF spectrum bands IV and V. This spectrum range is important to BT because it supports the digital terrestrial TV (DTT) platform that is an integral component of our BT Vision product. It will also support important new applications using the TV "White Spaces"(TVWS) spectrum when Ofcom gets the necessary licence-exemption regulations and associated database systems in place.

2. The combination of DTT and TVWS systems will together maximise the overall technical efficiency of the use of this spectrum band. We urge Ofcom to safeguard the availability of sufficient spectrum for these twocomplementary applications.

3. The entire range of 470-790MHz (including the unused 600MHz spectrum, but excluding TV channel 38) should be made available by the end of 2012 for licence-exempt use by systems operating in the TVWS spectrum. Access would require device geolocation and control by a database system in accordance with the regulatory framework that is currently being finalised with the assistance of the Industry Technical Working Group (TWG) on TVWS led by Ofcom.

4. As more experience is gained with use of TVWS spectrum we would encourage Ofcom to continue to refine the technical criteria and the rules by which access to this is managed. Ofcom should ensure that the efficiency of use of the spectrum by TVWS systems is maximised and that applications that are key to support Government policies and that are important to consumers, such as rural broadband deployed with the assistance of state subsidies, are appropriately accommodated and safeguarded within the regulatory arrangements.

5. The economic case for clearing 700MHz for mobile in preference to TV has not been demonstrated within the consultation. BT does not see a need to prioritise further mobile spectrum releasein the UHF spectrum range in the short to medium term. However, we recognisethat there is interest in 700MHz for future mobile broadband applications following the decision of the ITU WRC-12 conference to add an allocation to the mobile service (co-primary with Broadcasting). After the next ITU conference (WRC-15), when this new allocation becomes effective and the exact frequency boundary is decided, it is likely that other empty or under-used mobile bands (e.g. 800MHz, 2.6GHz, parts of 3.4-3.6GHz and 2.3-2.4GHz) will have been brought into use in the UK and other techniques for dealing with the growth in mobile data, such as Wi-Fi offload, use of TVWS and deployment of small cell systems may also be in wide use. A clearer assessment of demand for mobile spectrum may then be possible. Nevertheless, we agree that it is sensible to now start to explore the options for how 700MHz could be ultimately released for mobile in a way that will not damage the success of and future requirements for DTT.

6. BT supports Ofcom's "Option 3" as a basis for building a long-term strategy. That is to say we support the long-term goal to re-plan DTT within the existing DTT spectrum (excluding 700MHz) plus the 600MHz band, also allowing licence-exempt access to the interleaved TVWS spectrum (including 600MHz) at all stages, controlled by the Ofcom database system. We agree that six DTT multiplexes must be supported at the end of the re-planning exercise, but we urge Ofcom to examine whether during the transition stageadditional DTT multiplexes in 600MHz could be supported as a means of providing additional HD programme capacity that would encourage consumers to migrate to DVB-T2 technology, and wideband aerials where necessary. The additional multiplex transmitters could ultimately become part of the eventual re-planned platform (so investment is not wasted). If the timing of the move to the re-planned six multiplex platform is sufficiently far out it may be possible to at this point also migrate the majority of multiplexes to the more efficient DVB-T2 standard.We suggest that this is an area that Ofcom could explore further and, if workable scenarios can be identified, further detailed consultation on these may be appropriate.

1. Introduction

BT welcomes this consultation on Ofcom's long-term strategy for UHFbands IV and V. We consider this to be very timely now that the analogue to digital switchover and channel 61/62 clearance process in the UK draws to its completion and given the increasing interest to pursue a second digital dividend in the 700MHz range for mobile following the decisions taken in the ITU. We welcome Ofcom's decision to put the 600MHz auction on hold and to explore a different set of options that will aim to strengthen the DTT platform and support the growing interest in licence-exempt access to TVWS.

A summary of our views on the main issues is provided in section 2 and our answers to the specific questions that Ofcom has posed are provided in Section 3.

2. Summary of BT's views on the key issues

Importance of DTT

The DTT platform is highly valued by consumers, with about 40% of homes relying on this as their primary means of receiving most if not all of their TV programmes. It is important that this platform remains attractive relative to alternative delivery means and we urge Ofcom to ensure that any changes to the spectrum arrangements serve to enhance rather than damage the experience of UK consumers. We see the continued success of the DTT platform, delivering free-to-air and pay TV services alongside the cable and satellite platforms, as fundamentally important to an open and competitive market for bundled consumer propositions that include TV, broadband and phone services. It will be important, as a minimum,to maintain the existing number of multiplexes and where possible to increase capacity to support additional HD programming as this will be of increasing interest to consumers. Re-planning of the DTT platform should be done in a way that minimises disruption to consumers and should not result in them encountering additional costs as a result of freeing up spectrum for mobile. Any reconfiguration of the DTT platform should be planned in a way that enhances consumer experience, for example by providing additional programme choices (especially HD),and that eases the eventual migration to new more efficient transmission and encoding technology (DVB-T2 and MPEG4).

We agree that 600MHz should be included when seeking to re-plan the existing DTT platform. The possibility to introduce additional DTT MUXs in the short term ahead of the existing platform migration should also be considered and consulted on if Ofcom's technical work identifies that such scenarios are feasible.These new services could be incorporated into the overall re-plan of DTT in the long term.

600MHz

This spectrum must not be allowed to lie fallow and we propose that the 600MHz band should also be made available immediately for licence-exempt use by TVWS technology, which has the flexibility to migrate transmissions very quickly to other spectrum via the database system, as and when new DTT usage is brought into service. Prior to the commencement of new DTT services the 600MHz spectrum could be in effect reserved for licence-exempt use. It may even be appropriate to have part of the 600 MHz spectrum (or indeed some other part of the UHF band) remain clear of DTT use in the long-term if the TVWS systems were considered to be using the spectrum with sufficient intensity,or to safeguard and support applications that are key to Government policies and that are important to consumers, such as rural broadband deployed with the assistance of state subsidies. We therefore suggest that Ofcom should review the exact arrangements for managing the TVWS spectrum once further experience has been obtained with early commercial deployments.

Clearing 700MHz for mobile

The economic case for clearing 700MHz for mobile in preference to TV has not been demonstrated within the consultation. BT considers that any need for spectrum at 700MHz for use by mobile broadband services is, at best, a long term requirement and that the earliest availability date of 2018 mentioned in the consultation document is too soon. This date is sooner than would be needed given the many other spectrum bands that will become available for mobile and other available techniques to alleviate capacity (e.g. Wi-Fi off-load, use of small cells). Displacement of DTT from this spectrum would be a complex operation with some similarities to the 'digital switchover' activity. An early date would be very disruptive to DTT, whereas a later date could allow a more orderly migration of DTT in a time frame where the more efficient DVB-T2 technology would be much more widespread in consumer equipment and it might be possible to migrate most multiplexes directly to the more efficient standard rather than re-building less efficient DVB-T MUXs. The opportunity could be taken to enhance the efficiency of the DTT network through techniques such as Single Frequency Networks.For these reasons the DTT changes must be comprehensively planned to maximise the benefit to consumers and minimise potential disruption to the viewing public. We would suggest that a date of 2022 or beyond for clearing 700MHz would be more realistic.

3. Detailed response to the Consultation

BT's views on the individual questions posed in the consultation paper are given below.

Future mobile broadband spectrum requirements

Question 1: Do you agree that meeting the future growth in demand for mobile broadband capacity will deliver significant benefits to citizens and consumers?

Yes, we expect the growth in mobile broadband data consumption to continue and the ability to meet this demand will benefit consumers. It does not follow that this demand can only be met by making more spectrum available and, if more spectrum is part of the solution,this does not mean that 700 MHz is the most appropriate spectrum, for example taking into account the opportunity costs of using the spectrum for mobile rather than TV.

Question 2: Do you agree that additional harmonised mobile broadband spectrum will play an important role in meeting the future growth in demand for mobile broadband capacity? What are your views on the overall quantity of harmonised spectrum that will be required to meet future demand? How does this compare with the expected increase in spectrum for mobile use discussed in this section?

The amount of spectrum required will depend amongst other things on the level of demand (which may be influenced by pricing of services) and the cost of additional spectrum compared to other capacity solutions such as new technology and smaller cells. The more spectrum that is made available for mobile, the lower will be the market price and the more likely it will be that extra spectrum is used to most cost effectively meet capacity demand rather than other solutions such as use of more efficient technology, smaller cells and Wi-Fi off-load.

The ITU has in the past estimated the spectrum requirements of public mobile networks and studies for the 2007 ITU World Radiocommunication Conference generated a predicted requirement in ITU Regions 1 of between 1280 and 1720 MHz for International Mobile Telecommunications (IMT). Such estimates are however very dependent on the exact assumptions and factors such as what proportion of traffic is off-loaded to fixed networks via licence-exempt technologies can substantially affect the predictions. Given the enormous amount of new mobile spectrum that is likely to be made available in the coming years (as summarised in the consultation document) plus the availability of licence exempt spectrum (2.4GHz, 5GHz, TVWS) in addition to the various bands that are already licenced for mobile use would suggest that longer term additional mobile spectrum requirements can be satisfied. Perhaps a more relevant issue will be how many frequency bands mobile devices will be able to cover, and whether there will be an increasing trend to use smaller cells and techniques such as Wi-Fi offload rather than seeking to include support within devices for ever more harmonised spectrum bands.

Question 3: Do you agree that additional harmonised spectrum provided by the 700 MHz band could play an important role in meeting the future growth in mobile broadband capacity?

Ofcom has in another recent consultation in relation to the proposed 800/1800/2600MHz award demonstrated that sub 1 GHz spectrum is not essential for providing competing mobile networks if sufficient higher frequency spectrum is available. We are not convinced that 700MHz is essential to meet growth in mobile capacity demand given the many other bands that are available or will become available (e.g. 800MHz, 2.6GHz, parts of 3.4-3.6GHz and 2.3-2.4GHz). Also there are other technical solutions such as Wi-Fi off-load and small cells. Nevertheless we acknowledge that it might have a role in meeting future broadband demand, depending amongst other things on the cost of acquiring/using the spectrum compared to the cost of other spectrum or other technology solutions.

As usage of portable devices has grown it has become clear that data usage is increasingly focused on indoor consumption, and is less suited to being served by traditional macro network builds. Frequencies below 1GHz are more suited for coverage, rather than capacity, and indoor capacity is therefore best served by higher frequency, low power solutions such as Wi-Fi and femtocells, typically at frequencies above 2GHz. A clear trend is emerging towards such small cell systems. Nevertheless additional harmonised spectrum (even below 1GHz) can have a *long term* role in meeting mobile broadband demand.

Question 4: Do you agree that the value of the role played by the 700 MHz band in meeting the future growth in mobile broadband capacity would be greater if it becomes available before other capacity enhancing techniques have been exhausted at existing mobile sites?

No, we think that use of other existing harmonised mobile bands that are unused but are soon to be made available plus greater use of smaller cells and off-load of traffic onto Wi-Fi would be better solutions than making 700MHz available early and would lead to more efficient use of spectrum.

Question 5: What timing of 700MHz release would maximise the benefits associated with its use for mobile broadband?

Release of 700MHz should be considered in the longer term after other spectrum bands such as 800 MHz, 2.6GHz, 2.3-2.4GHz and 3.4-3.6GHz have been used efficiently. Given the need to release 700MHz in a way that minimises disruption to DTT we suggest that a date of 2022 or later may be appropriate.

Future DTT spectrum requirements

Question 6: Do you agree that DTT will continue to play an important role in providing universal low cost access to PSB content over at least the next decade?

We agree with Ofcom's analysis concerning the continuing importance of DTT. BT is investing in superfast broadband and content delivery networks that will complement the services delivered via the DTT platform, but it is not expected that delivery of TV services via broadband will be able to entirely replace DTT provision for many years to come.

On a point of detail, we note that in Figure 9 of the consultation the indicatedpercentages for the number of main TV sets in Q1/2011 sum to 97% rather than 100%. Ofcom references this figureto state that 38% of homes use DTT for their main set by January 2011. Using figures published by the Broadcasters Audience Research Board[1]it can be deduced (making the assumption that homes with satellite or cable or analogue TV would use this on their main set) that as of 1 January 2012 the number of homes receiving digital terrestrial broadcasting on their main set is 40%.

[1] See http://www.barb.co.uk/facts/tv-trends/download/2011-YY-TVTrends.pdf (Table 4)

Question 7: Do you agree that, absent major changes in available spectrum, DTT would continue to remain attractive to viewers and deliver important benefits to citizens and consumers over at least the next decade?

DTT needs to be able to develop in order to continue to offer a viable competitive alternative to TV delivery via cable or satellite. Some innovation will occur in ways that do not need further spectrum, but in our view there will be more scope for new services (such as HD programming) if additional DTT spectrum is made available. Without such opportunities the attractiveness of DTT is likely to decline.

Question 8: What are your views on the future technical evolution of the DTT platform? Are there other relevant factors affecting future DTT spectrum requirements that we should consider as we develop an approach to secure benefits from UHF band IV and V over the long term?

There are planned improvements to MPEG encoding technology that could offer future spectrum efficiency benefits for the DTT platform. However, there would need to be a carefully planned implementation strategy to ensure existing services continued to be available to the majority of the installed base of receivers. The approach used to introduce Freeview HD is a good model, where new reception equipment would only be required by consumers accessing additional or new services. The 600MHz spectrum could be used to pilot various techniques to use DTT spectrum more efficiently through the introduction of additional DTT services e.g. using Single Frequency Networks (SFNs) and the latest technical standards.

Question 9: Do you agree that a longer term approach to secure benefits from UHF band IV and V should consider how to safeguard benefits delivered by the DTT platform?

Longer term (e.g. 2020 or later) the importance of the terrestrial platform may have diminished given the capability of broadband and internet enabled devices for TV reception, nevertheless we anticipate that DTT will still remain an important resource for a significant number of viewers.

Other uses of UHF bands IV and V

Question 10: Are there other material factors affecting the future requirements of PMSE that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

BT has no comment on this question.

Question 11: Are there other material factors affecting the future requirements of Local TV that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

Reservation of spectrum for local TV will reduce the bandwidth available for other applications proposed by Ofcom. We believe that other delivery mechanisms including multicast (distribution of live TV broadcasts over broadband) may provide a credible solution for local TV, and thus in general we do not support the use of DTT spectrum for local TV.

Question 12: Are there other material factors affecting the future requirements of WSD applications that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

We anticipate widespread usage of the interleaved spectrum by TV white space devices (WSDs) in the long term, maximising the use of the UHF spectrum bands IV and V, and we urge Ofcom to enable WSD access to the whole of the 600 MHz band and remaining DTT spectrum. Where spectrum is allocated and not yet in use, for example local TV multiplexes that are yet to commence service, then these channels should be made available for WSDs. WSDs should also be able to use 700MHz spectrum right up until it is auctioned, in order to make efficient use of the UHF spectrum as a whole.

Prior to the commencement of new DTT services the 600MHz spectrum could be in effect reserved for licence-exempt use. It may even be appropriate to have part of the 600MHz spectrum (or indeed some other part of the UHF band) remain clear of DTT use in the long-term if the TVWS systems were considered to be using the spectrum with sufficient intensity,or to safeguard and support applications

that are key to Government policies and that are important to consumers, such as rural broadband deployed with the assistance of state subsidies. We therefore suggest that Ofcom should review the exact arrangements for managing the TVWS spectrum once further experience has been obtained with early commercial deployments.

Question 13: Aside from WSDs, are there other innovative ways in which to use UHF bands IV and V to deliver services and, therefore, material benefits to users
BT has no comment on this question

Question 14: Are there other material factors affecting the future requirements of emergency services applications that we should be aware of as we develop an approach to secure long term benefits from UHF band IV and V?
BT notes that the Cabinet Office has publicly expressed interest in using TV White Space to augment emergency service data communications[2]. Accordingly, TVWS has at least three strong communities of interest at this time: rural broadband, machine-to-machine communications and emergency services, and more may develop in the future. Reductions in the amount of spectrum available to TVWS devices could impact these proposals to make efficient use of the scarce resources in the UHF spectrum.

Securing long term benefits for citizens and consumers
Question 15: Do you agree that the approach that is most likely to secure significant benefits from UHF band IV and V over the long term is one that enables the release of the 700 MHz band for mobile broadband whilst also ensuring the role of the DTT platform is safeguarded?
We note that mobile systems can operate in a very large number of alternative harmonised mobile bands whereas DTT cannot. There may be an implicit assumption in Ofcom's proposals that the economic value of mobile in 700MHz is greater than its continued use for DTT. At a future point when the large amount of additional new mobile spectrum called for by the EU Radio Spectrum Policy Programme has been made available, it is possible that harmonised TV spectrum could be scarcer or more valuable than mobile spectrum. Without a clear measure of the economic benefits of using spectrum for mobile rather than DTT (or other uses) in various time frames, and the costs of implementing the DTT platform changes to operators and consumers, it is hard to be certain as to which approach is best and our views on the options that Ofcom has identified are given in this context.

Recognising that this section is specifically addressing the *long term* benefits that Ofcom is aiming to facilitate, we agree that retainingthe status quo (Option 1) has shortcomings in addressing long term mobile spectrum needs. For the second option, where 700MHz spectrum is released for mobile but no substitute spectrum is provided for DTT,we agree with Ofcom that the restriction in the amount of spectrum available for DTT would raise a number of risks in relation to the provision of low cost universal accessto TV and consumer choice. This option would constrain the potential for innovation in DTT services as additional multiplexes could not beaccommodated. We favour the third option of releasing the 700MHz spectrum for mobile broadband in the long term and providing spectrum in the 600MHz band for DTT (and, as mentioned in our answer to Question 12,for low power services using white space device (WSD) technology).

Question 16: Do you believe there is a material risk that the DTT platform will have insufficient spectrum to continue to deliver important benefits (including providing universal low cost access to PSB content) if the 600MHz band is not used for DTT after clearance of the 700 MHz band?
The predicted lower levels of coverage for the PSB and/or COM multiplexescombined with a reduction in the number and range of services available via the DTT platform are significant factors, as is the lack

[2] http://www.cambridgewireless.co.uk/Presentation/CWS-UK Cabinet Office_Nick Welsh.pdf

of ability to fulfil future demand for HD programming in this scenario.We therefore agree that 600MHz must be available for any re-planned DTT platform.

Question 17: Do you believe that using the 600 MHz band for DTT after clearing the 700 MHz band would reduce the risk that the DTT platform will not be able to continue to provide important citizen and consumer benefits?

Yes. We believe that more (not less) terrestrial platform capacity is needed, in particular to support HD programming and provide a competitive delivery platform to satellite and cable. The 600MHz spectrum is already cleared and can be made available for more DTT services in the short to medium term (prior to the full clearance of 700MHz). With the improvements in spectrum efficiency that will come through techniques such as the judicious use of SFNs and the expected technical improvements in MPEG4, these new services could continue to operate in the long termafter 700MHz clearance as an integral part of the necessary channel re-plan.

Question 18: Do you agree that the future benefits for citizens and consumers of enabling the release of the 700 MHz band whilst maintaining the role of DTT are likely to outweigh the loss in benefits of the 600 MHz band not being able to be used for other services in the long term?

We believe it is essential that current DTT services continue to be maintained and that further DTT services are enabled for the future, and this requires the use of the 600MHz band for DTT if the 700 MHz band is to be cleared for mobile broadband. We would also point out that WSDs can be accommodated in the 600 MHz band. The innovative opportunistic access mechanism inherent in white space devices would enable the 600MHz band to be brought into use earlier than the date of clearance of the 700MHz band, without prejudice to any other services to be introduced into the 600 MHz band (including DTT).

Question 19: Have we identified correctly the possible short-term uses of the 600 MHz spectrum? Are there other short-term uses we should consider?

In parallel with the debate and necessary technical studies on 700MHz clearance, the cleared spectrum at 600MHz must be brought back into use as soon as possible in the interim, to provide new short term DTT capacity (such as for HD programming). These new services should be incorporated into the overall re-plan of DTT in the long term. The 600MHz band should also be made available immediately for licence-exempt use by TVWS technology, which has the flexibility to migrate transmissions very quickly to other spectrum as and when new DTT usage is brought into service.

Question 20: Which option(s) for releasing 600 MHz in the short term would maximise its value whilst supporting our proposed longer term objectives?

Immediate use for TVWS systems controlled by a database system would be an efficient and effective use of the spectrum. We also would support short-term use for additional DTT capacity (e.g. HD) where this is deemed technically and commercial feasible, for example if it can be done in a way that would enable new 600MHz DTT transmitters to be established early and then later migratedinto part of the re-planned DTT six multiplex platform in the longer-term when the 700MHz is cleared. This would of course depend on the technical and commercial viability of such an option and if some relevant technical scenarios can be identified this might be an area where a further consultation may be appropriate. It might for example help stimulate consumers to migrate to more efficient DVB-T2 equipment and invest in wideband aerials where necessary in order to get early access to additional content.

The wider impacts of changing the use of the 700MHz band

Question 21: Do you agree that the wider impacts of a future change of use of the 700MHz band could be managed to prevent them having a detrimental impact on consumers and the services operating in this band?

Previous Ofcom consultations on the 600 MHz and 800 MHz spectrum bands and usage of the interleaved spectrum by WSDs have quantified the costs and benefits to citizens. DTT is integral to our BT Vision service that is serving over 700 000 customers to date,so we are dependent on continued interference-free reception, including protection from future 4G devices.We would highlight the difficult adjacent channel compatibility problems that arise between TV and mobile systems. This has been a concern in relation to the 800MHz auction spectrum where careful attention has been paid to the frequency separation of base stations and mobile stations from TV reception channels, including consideration of necessary guard bands and interference mitigation measures (e.g. use of special filters to solve specific problems).The same issues would reoccur in relation to new mobile services in 700MHz spectrum.

Realignment of TV frequencies (as was done for digital switchover) is disruptive and causes substantial help and support costs in the TV industry,and potentially for equipment manufacturers.Displacement of DTT from the 700MHz spectrum band would be a complex operation with some similarities to the digital switchover activity and must be comprehensively planned to minimise potential disruption to the viewing public. It would make sense to plan the migration of the DTT services from 700MHz and re-planning of the 6 DTT multiplexes in a time frame that minimises costs to consumers and enables transition to a new more efficient platform based on DVB-T2 transmission rather than rebuilding less efficient DVB-T transmitters.The re-planning exercise needs to consider all potential impacts on consumers, and the associated costs. As an example, Ofcom has estimated the number of households that may need to install a new wideband aerial to continue to receive all six multiplexes after a frequency re-plan, but there is no analysis of the costs to consumers and what compensation should be made available.

Proposed approach for securing future benefits and next steps

Question 22: Do you agree that the approach set out in this consultation is likely to secure significant benefits for citizens and consumers over the long term?

Yes, an approach based on Option 3 (as detailed in our answer to Question 15) is likely to secure significant benefits for citizens and consumers.

Question 23: Have we correctly identified the main areas of future work that could follow this consultation process subject to its outcome?

Yes, we agree with the list of future work areas that Ofcom has identified.