Response from Brian Copsey

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?

No

The Question is rather loaded, as the only way forward withinthe previous sections ispredominately Mobile Networks, whereas surely mobile broadband is the ability of a device to connect to the internet?This can be achieved better by a range of other platforms, reserving the truly mobile use to the mobile networks (even coaches and trains allow access to the internet without the mobile networks!). This consultation and previous Ofcom documents assumes that all mobile broadband must be provided by mobile network operators ,this is not the case and the truly mobile use should be identified and other complementary options identified in my overview explored for the non-truly mobile use.

All the financial advantages once again are focused on how many social and economic benefits are obtained from "Mobile Networks". If we examine but one of the many reports "Economic impact of the use of radio spectrum in the UK" whilst it happily provides vast figures for mobile "advantage" many other uses of spectrum such as PMSE which has both social and economic advantages to the UK are totally missing from the balance sheet. In my overview I have pulled together a *few* publically available figures which total a minimum of £18,851,491,763.20 for the uk and an example which shows 474.43bn euro for the German Economy (further research could show similar figures for the UK) plus at least some 1.5 million jobs. Another major issue ignored by Ofcoms reports is that they consider only the main TV in a household whereas the majority of households have between 3-6 fixed and mobile TV, s, if these are taken into account the down side of mobile allocations is *considerably* larger

Whilst the future grown in mobile broadband is of benefit, it should not be at the expense, both financial and social of citizens by extra costs to fund the mobile network profits, these cost include replacing systems and equipment due to interference, re designing and implementing for the third time the TV distribution networks coupled with loss of TV services. Neither should it destroy or disadvantage other industries, i.e. PMSE, Cable TV and Communal Aerial systems

During the Digital Dividend debates in the UK and Europe we were constantly told that the 800MHz band would provide sufficient spectrum to deliver rural broadband and mobile broadband, yet before these networks are deployed we are now informed that the 700MHz band is also needed. Surly this suggests that mobile networks are incapable of delivering

mobile and rural broadband in a cost and spectrum efficient manner and other methods of delivery are urgently needed.

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?

No

An extremely misleading perspective on the amount of spectrum currently allocated to mobile networks is given in table 1, if wejust consider the 800MHz line it states that it has 30MHz (downlink) however the actual spectrum allocated is 790-862MHz some 72MHz if we add to this the four polluted TV channels below 790 another 32MHz and at least 10MHz above we arrive at a figure of 116MHz of prime spectrum. Is this an efficient use of spectrum?

When the full spectrum allocations to mobile networks is considered in the other bands similar expansion of the amount of spectrum is shown

Before contemplating any further allocation's to mobile the siren voices of world harmonisation, greater economies of scale etc.should carefully balanced against the real costs of implementation which should take in all the associated costs to society including loss of facilities from the DTT and cable platforms , PMSE and the local TV.

If we are looking at access to the internet for citizens at high speeds surely 116MHz could provide much better distribution of internet access using small cell technologies fed with fibre or an extension of the cable TV networks currently offering 50 and 100 m broadband(probably up to 400 in the near future)

To date the 2.4GHz SRD band is probably the most cost effective and spectrum efficient spectrum allocation in the history of radio, replicating this in any future allocations would be better for UK Ltd than the addition of yet another mobile network of limited capacity

Looking at the amount of spectrum required for mobile networks, if the true amount of spectrum currently allocated is considered and converted to an efficient modulation scheme, with a single transmission supplier (other companies would rent capacity from them)augmentedwith small cell technologies which have not been fully explored by Ofcom *and* fixed line is considered, no further spectrum is required for mobile networks.

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?

No for all the reasons given above

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

If integrated planning for small cell technologies coupled with fibre and fixed networks are implemented then mobile networks can revert to carrying only truly mobile traffic and offload all other uses and then 700 band is not required.

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

None

As with an integrated plan for the UK distribution of internet access coupled with the greater efficiency of a single transmission organisation removes the requirement for the 700 band

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?

Yes

It is imperative that Ofcom improves the immunity and selectivity of TV and other media receivers and installations to both enhance the citizen's experience and allow greater use of white space devices. To date the reallocation of spectrum to the mobile industry has been carried out and only then has the interference issues been reviewed, with a little forethought improving the TV receivers and installations would have saved a great deal of time money and bad feeling from citizens as they experience the "benefits" of mobile interference.

Whilst the use of IPTV is referred to, this will require an increasingly faster internet connection to enjoy the full benefits of HD, 3D etc. These connections will place a heavy burden on the internet and household costs. Terrestrial TV distribution reduces the burden on both.

The DTT platform is still and will probably remain the most cost and spectrum efficient method of media delivery.

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?

I do not fully understand the use of the word *"absent"* in this context but with the improvementsand enhancements in the DTT platform plus the economic factors in this age of austerity off air reception will remain the mainstay of the public's TV watching both at home and mobile use (Camping, boats etc.)

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

Yes one major consideration is that T2 and other techniques (3D) where designed to provide more robust and higher quality reception and adequate spectrum is required to provide the full benefits to citizens rather than using these advances to increase the amount of mobile spectrum

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?

Safeguarding the DTT platform and its ability to deliver the new facilities to the citizen**must** be the prime consideration for the strategy for 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?

Yes

First: PMSE has a major contribution to both the financial (at least £18,851,491,763.20 plus consider how much of the 474.43bn euro for Germany is also relevant to the UK economy) and social fabric of the UK ETSI TR 102 546 (Attached) provides a picture of the major professional use but does not include the massive use by groups, up and coming artists, amateur dramatics and schools. The professional use will bereduced by the mobile allocation between 790-862MHZ and is now also under threat from WSD use. Please consider that a "show" cannot tolerate interference (even the 1% currently under discussion for WSD) either because of the result that the interference will causing massive audio output which could damage the audience hearing or cause panic and because shows, theatre performances etc. are live and cannot just stop and be re-run .

Another "cost" which does not appear in the customer surplus generated by the mobile networks is that of replacing very expensive multi-channel radio microphone and In Ear

Monitors to the entertainment industry and of course to all the schools and other current users.

Channel 38 is a very welcome allocation but is also under threat from whichever services are placed either side of the channel.

Section 5.8 makes the claim: *it can provide spectrum efficiency gains for multichannel systems that span two or more adjacent 8 MHz TV channels, as digital transmissions are less susceptible to adjacent channel interference than analogue*

Unfortunately this is inaccurate; the report referred to and only recently released is some years old, recent testing has shown that dependant on the interferer digital systems respond to interference in a similar way to analogue systems.

A pious hope that "digital" will somehow solve the problem of a lack of spectrum is not a credible strategy for this issue

Currently the vast majority of professional and other systems are analogue and have a life span of some 20 years, in these austere times the cost of new digital equipment for very little perceived improvement is unlikely to be welcomed by users
.
If the 700band is released for mobile this will result in compacting the TV channels reducing the "white space" which traditionally PMSE has used (and will have to share with WSD), resulting in potential devastation of the entertainment and programme making industries. In spite of great efforts by the PMSE industry no replacement spectrum has been identified, If Ofcom chose to go ahead with releasing the 700band part of the work **MUST** be to quickly identify replacement spectrum in order for manufactures to develop equipment and give time for it to take its place in the market

The Result of losing the 700band for PMSE use would heavily impact the tourist industry and also the ability of the UK to host major events,

- A case in point is the Olympics; no proposals have been put forward by Ofcom to replace this spectrum.
- Another is the coverage of the Queens jubilee which although unlikely to happen again in the near future, Coronations and weddings will require similar spectrum resource

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?

Yes

In reading the Arqiva report, it would appear that we will lose this fledging industry in the rush to maximise the profits of mobile operators. Provision must be made to support the local TV initiative

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?

Yes

Reports on available white space for these devices already shows limited availability in many conurbation's, reducing this further will make WSD industry financially unsustainable and lose the technical and financial benefits of UK companies investment in R&D to the UK

WSD will be a much better method of delivering rural broadband, which whilst the mobile industry stated it could achieve with the 800 band it would appear it will be unable to deliver.

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

Yes

Look at the whole of the technology available rather than focusing on mobile networks. One example is that in many Towns and Cities fibre has been installed at public expense, at present many of these are closed systems but with the addition of say WiFi could provide broadband access to large numbers of people. I am sure there are many other arrears where better marrying fixed line with a radio last mile (or half mile) would achieve cost and spectrum delivery of broadened

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?

Yes, the use of TETRA or additional LTE in 470-790 MHz would greatly impact the existing DTT, PMSE and potential WSD use.

The shared use of existing mobile networks on a virtual basis has consistently been rejected by the emergency services; it should now be fully examined.

Additional spectrum could possibly be found the 174-225MHz band

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?

No

Option 1 provides the maxim benefit to citizen's coupled with small cell technologies. This would result in minimising the costs to citizen's and industry of the interference, new equipment, redesign of TV networks and allocation costs whilst still meeting Ofcoms objectives

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?

YES

Not allocating the 700 band to mobile solves this problem.

If the 600 band is used for DTT the PMSE use of Channel 38 must be protected and expanded

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

Yes

But not allocating the 700 band to mobile also solves the problem

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?

No

The maximum benefit to citizen's, consumers, tax payers, DTT and PMSE will be obtained by not allocating the 700band to mobile networks

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?

Whilst you have identified some uses you have not indicated where these services will operate after DTT starts to use the spectrum, and who pays for the reallocation. The general public will not be happy if WSD facilities they have used and enjoyed are removed without any replacement

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

To totally reject the reallocation of the 700 band to mobile networks

Re 7.3

- *Ensuring that a future frequency re-plan of the DTT platform remains compatible with roof top aerials by signalling the need to use wideband aerials capable of receiving signals from across the whole of the DTT band;*

Does the term wideband mean 470-862 MHz, its current meaning? If so this enhances the interference to domestic viewers from both the 800 and 700 band mobile systems

- *Ensuring that potential interference between mobile broadband services operating in the 700 MHz band and DTT is understood as fully and as early as possible. Any interference issues should then be managed where feasible through an appropriate design of a new 700 MHz band plan and the early signalling of the benefits of new DTT receivers being capable of co-existing with mobile broadband services in the 700 MHz band, reducing the need for more direct forms of intervention;*

Does this mean that a useable guard band will be imposed in the mobile spectrum rather than polluting the some four or five DTT platform channels?

Nothing has been said about the overall immunity of domestic installations which include cable connectors and amplifiers in addition to aerial and TV, how does Ofcom propose to improve these before inflicting additional interference on the domestic viewer?

How will Ofcom ensure that *new DTT receivers being capable of co-existing with mobile broadband services?*
Little has come from the extensive work on the interference from the 800 band due to poor immunity requirements and exclusion of TV receivers, cable and connectors from the requirements of the R&TTE directive

- *Ensuring the continuing provision of PMSE services by early signalling the need for future equipment to be capable of operating in the interleaved spectrum of a re-planned DTT platform, and the need for more efficient uses to be made of this spectrum in the future, which, for example, could be achieved through a progressive digitisation of PMSE services and cognitive radio developments.*

capable of operating in the interleaved spectrum of a re-planned DTT platform, taking into consideration the Arqiva report there is unlikely to be any useable spectrum, if this is the case where will PMSE be rehoused? Manufacturers need to understand this in order to develop equipment in an appropriate time scale

Efficient uses to be made of this spectrum in the future, which,
PMSE equipment is already one the most spectrum efficient systems, given the 100% duty cycle andsimultaneous use, often in excess of 100 channels, with long performances (6 plus hours) required of miniature transmitters.

which, for example, could be achieved through a progressive digitisation of PMSE services and cognitive radio developments.
Digitisation of the PMSE equipment will give little advantage over the current equipment in spectrum efficiency. Whilst the term "cognitive" is used the ability of a 100 transmitter system being fully cognitive are a long way away, the industry via an ETSI Special Task Force linked to a German funded C-PMSE project are investigating and designing early demonstrators but are unlikely to produce replacement professional multiple channel systems in the time scales envisaged by Ofcom.
Of course the system being cognitive does not reduce the amount of spectrum required

- *Ensuring an ongoing opportunity for applications based White Space Devices to continue to be able to operate in the interleaved spectrum of a re-planned DTT platform, by updating the geolocation database used by these services.*

Referring to the Arqiva report and the requirements of PMSE, the question is "will there be any spectrum for WSD" except in some rural arrears

7.5 A change of use of the 700 MHz band for mobile broadband would require a frequency re-plan of the existing DTT platform. One aspect of this re-plan is that it could create a need for some DTT households to use a wideband aerial.
A number of estimates put these numbers in excess of one million homes, who pays; the current proposals for the 800 band suggest the viewer
Again the term "wide band aerial is used, if this means 470 – 862, the current definition this will enhance the interference from both 700 & 800 band mobile interference and remove any interference rejection which had been gained for the 800 band
If Ofcom do not mean 470 -862MHz they should rapidly discusses with the Confederation of Aerial Industries their requirements

7.8 In practice, only 40% of UK households are using DTT as their main means of receiving TV, reducing the number of households that may need to use a wideband aerial to continue to receive the PSB services on their main TV set to 0.12% and all six multiplexes to 12%.

Whilst this figure itself can be disputed, as the definition of *main means of receiving TV* does not take into account the various different approaches to viewing TV, for a younger viewer the net may be the best approach or use of a TV receiver linked to a PC neither does this 40%t include the number of households using the DTT platform as a second or third set or for mobile use to view channels not available on other platforms.

A figure of some 65% has often been used which changes the dynamics of Ofcoms argument

7.9 It should also be noted that many of the households that would potentially need a wideband aerial have already installed one for digital switchover. Previous research76 has shown that approximately 26% of rooftop aerials have been upgraded to wideband aerials. This further reduces the number of households that would need to install a new wideband

aerial to approximately 0.1% (25,000 households) to receive the PSB services and all six multiplexes to 9% (2.5m households).

As previously stated if these aerials are covering 470-862 MHz especially in those with an amplifier the interference will be greater than an aerial which only covers the actual TV channels transmitted in that area

7.12 A similar approach may be required if mobile services operate in the 700 MHz band in the future, using filters adapted to this band. However, it is too soon to say what these filtering requirements might be and whether they would be required until decisions have been reached over the 700 MHz band plan to be used for mobile broadband services in ITU Region 1 and the size of any guard band has been determined between the 700 MHz band and retained DTT spectrum.

Unlike the 800 band allocation an adequate guard band (at least 12MHz) outside the DTT spectrum must be obtained.
If this goes ahead the policy of polluter pays should be FULLY implemented rather than the current proposals where only limited assistance with the interference will be supplied (one example being only the main TV will be cured)

7.13 One of the benefits of developing a forwards looking strategy for the future release of the 700 MHz band is that these considerations can be built into international negotiations over the future 700 MHz band plan to be adopted for mobile broadband services. It also enables an early signalling to be provided to DTT equipment manufacturers to recommend the design of future products such that these would be capable of co-existing with future mobile broadband services operating in the 700 MHz band.

How will the design of DTT equipment be influenced in the timescales suggested by Ofcom, and will this influence be extended to the whole installation i.e. cable connectors aerial and amplifiers?

7.15 In February 2012, the International Telecommunication Union's (ITU's) World Radiocommunication Conference (WRC) decided that the 700 MHz band would be allocated on a co-primary basis for broadcast and mobile broadband use. This new allocation will be effective following the next WRC in 2015 on completion of relevant technical studies, before becoming applicable to ITU Region 1, which includes Europe, Africa and parts of the Middle East.

The original request came from the African countries who rightly see this as a cost effective method of extending their networks and where the spectrum is not currently heavily used. There is no reason either by re defining the Region 1 boundaries or agreeing the release of spectrum in Africa that there requirements cannot be met without involving UK and Europe in another costly excise for minimal gain.

7.18 Ofcom recently published a draft Note for Applicants on Coverage of Local Television77 which details the proposed minimum coverage requirements and transmission arrangements

for local TV services. Many of the proposed local TV transmitter sites would need to move to a new frequency following a future frequency re-plan of the DTT platform

Who is likely to invest in these services with the uncertainty of the 700 band? A great loss to the citizens of the UK

7.27 It is expected that PMSE will continue to have access to the remaining interleaved spectrum. If the 700 MHz band is cleared and the 600 MHz band is made available for interleaved access then PMSE would have access to 216 MHz of spectrum as compared with 256 MHz as identified in our statement on future access to interleaved spectrum for programme making and special events published on 16 May 201179. This does not include channel 38 which is exclusively allocated to PMSE and does not form part of the interleaved spectrum

A major issue is not just the theoretical availability of spectrum BUT the physical location of that spectrum and the quality of the spectrum, I understand from this document that this would be shared with WSD and possible PPDR which means that 216MHz would NOT be available

7.28 Spectrum availability for PMSE is dependent on the requirement to protect DTT and the interference from DTT services. This is specific to any given location including whether the use is indoors or outdoors. As laid out in our May 2011 statement all interleaved spectrum would be available indoors with various levels of 'quality' depending on incoming DTT interference. Outdoor use would be restricted by the need to protect DTT.

This ignores the interference from any new mobile service, WSD and PPDR which will further reduce the amount of spectrum available, as previously stated radio microphone use cannot tolerate in band interference

7.29 In the future, there may be possibilities to enable the existing levels of PMSE use to continue by taking advantage of more efficient technologies, such as digital microphones, or the more efficient allocation of frequencies. We welcome further engagement with the PMSE community and manufacturers of PMSE devices on these approaches and would, in particular, like to understand more about on-going research to improve the efficiency of PMSE equipment

- *there may be possibilities* could Ofcom please expand on this, otherwise this section does not provide any answers to a lack of spectrum generated by Ofcom
- As previously stated overall digital is not any more spectrum efficient than analogue.
- The term *more efficient allocation of frequencies* is not explained what is meant by this interesting concept?

The PMSE industry has made great efforts to assist Ofcom and CEPT in its compatibility work and is happy to engage with Ofcom on this subject please contact me at BC@copsey-comms.com to arrange a meeting.

Information from the ETSI and German work has been (and will be) provided to Ofcom and CEPT as it has become available
The Industry is revising the ETSI standards to include information gained in recent trials but is hampered by lack of information on spectrum availability from Administrations.

Unfortunately the industry is also hampered by the rules of physics, which parts of this consultation appear to ignore i.e. with the limited white space spectrum predicted by Arqiva not all the services and systems can be using it at the same time in the same space.

7.30 Clearing the 700 MHz band for mobile broadband use will also have an impact on the range of frequencies available for interleaved access. In order to keep complexity and costs down, PMSE equipment often has a limited tuneable range, i.e. equipment can operate on only a subset of the available interleaved frequencies. The tuneable range of equipment varies between device type and manufacturer and can range from approximately 40 MHz to 180 MHz. Equipment operating in the 700 MHz band and with a small tuneable range will be unable to be used in the event that this band is cleared. Equipment is currently available with a tuneable range covering the 600 MHz band

Given that may organisations are being forced to purchase new equipment due to the 800 band spectrum allocation, will Ofcom be paying for the second change of equipment?
An early answer would be greatly appreciated

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?

NO

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?

NO

This document appears to take it for granted that the best way forward is yet more mobile networks the release of the 700 band is unnecessary and expensive for the taxpayer citizen and industry. Whilst mobile broadband has advantages, as previously laid out there are better spectrum efficient and cost effective ways to achieve this. However with the financial muscle of the mobile operators will we ever see a real analysis of the *significant benefits* as opposed to the costs and loss of benefits?

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

No