Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:	Mobile Data Strategy
To (Ofcom contact):	mobiledatastrategy@ofcom.org.uk
Name of respondent:	Arqiva Limited
Representing (self or organisation/s):	Organisation
Address (if not received by email):	

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Whole response		Organisation	
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Name Dr Peter Couch Signed (if hard copy)

Head of Strategic Planning for and on behalf of Arqiva Limited

Mobile Data Strategy

About Arqiva

Arqiva is the communications infrastructure and media services company operating at the heart of the broadcast and mobile communications industry and at the forefront of network solutions and services in an increasingly digital world. Arqiva provides much of the infrastructure behind television, radio and wireless communications in the UK and has a growing presence in Ireland, mainland Europe and the USA.

The company supports cellular, wireless broadband, video, voice and data solutions for public and private sector customers.

Arqiva is a founder member and shareholder of Freeview (Arqiva broadcasts all six Freeview multiplexes and is the licensed operator of two of them) recently we have secured the licence and launched the High Definition Multiplex in the 600 MHz band. Arqiva was a key launch technology partner for Freesat. We own Connect TV, the first company to launch a live IP streaming channel on Freeview. Arqiva is also the licensed operator of the Digital One – the national commercial DAB digital radio multiplex.

Arqiva operates shared radio sites (16 700 marketable sites, 8 700 sites active with site share licences) throughout the UK and Ireland including masts, towers and rooftops from under 30 to over 300 metres tall as well as a number of international satellite teleports.

In Arqiva WiFi we own one of the UK's largest WiFi hotspot providers, with about 25 000 access points, that enables us to build a unique proposition for WiFi hotspot and outdoor WiFi provision in the UK.

Our major customers include the BBC, ITV, Channel 4, Five, BSkyB, Classic FM, the four UK mobile operators, the Metropolitan Police, Airwave and the RNLI.

Arqiva is owned by a consortium of long-term investors and has its headquarters in Hampshire, with major UK offices in London, Buckinghamshire and Yorkshire.

Mobile Data Strategy

Executive Summary

Arqiva welcomes the opportunity to respond to Ofcom's Mobile Data Strategy in light of the critical role that spectrum plays in our commercial interests, most notably the UHF spectrum 470 – 790 MHz and the Wi-Fi spectrum on which our Wholesale Wi-Fi business depends.

There are three elements that should underpin any forecast of spectrum requirements to support mobile data traffic growth

- Circumstances of consumption, mobile or nomadic;
- Future technology enhancements; and
- Availability of suitable infrastructure / network assets to facilitate the service

We encourage Ofcom to further explore these aspects in their appraisal of future spectrum requirements. In particular, we note concerns that the macro-cellular site basis and also the proportion of offload traffic to Wi-Fi networks on which the analyses are based are understated.

On the subject of specific bands of concern to Arqiva we note;

- 470 – 694 MHz; and
- Additional Spectrum for Wi-Fi

For the 470 – 694 MHz band we note how little consideration has given to the importance and value of incumbent uses, DTT, PMSE and future White Space, which depend on this spectrum. Furthermore, there is no detailed economic appraisal of the cost and benefits of such a displacement of incumbent services which we believe should be a critical aspect of any appraisal process.

Additional spectrum for Wi-Fi we note that the proportion of mobile data traffic that is subject to offload is understated and that the developing role of Public Wi-Fi deployments has been overlooked. To this end, we believe that Wi-Fi systems have greater existing and future role in facilitating mobile data traffic than envisaged in this appraisal and we encourage Ofcom to re-visit this point and its implications for future spectrum priorities.

Finally, Arqiva encourage Ofcom to take account of its duty to protect the consumer interest. To this end, it should avoid the risk of market signalling that may result in a risk of destabilising any platform on which the consumer depends. We believe that this is a likely consequence of the identification of a co-primary allocation to mobile broadband services (IMT) of the 470 – 694 MHz band at WRC-15 and should be avoided in Region 1. We urge Ofcom to take the appropriate steps in the International process to avoid this outcome – particularly when the case for such an allocation has not been made and as noted from Ofcom's own analysis would not be relevant in the foreseeable future, i.e. next 10 years, beyond which forecasts are meaningless.

Mobile Data Strategy

Detailed Responses to Questions

Introduction

Arqiva welcomes the opportunity to respond to Ofcom's Mobile Data Strategy in light of the critical role that spectrum plays in our commercial interests, most notably the UHF spectrum 470 – 790 MHz and the Wi-Fi spectrum. To date we have worked closely with Ofcom to ensure a balanced debate in terms of the spectrum needs to support increases in mobile data traffic and we are keen to continue to work with Ofcom on this highly critical topic. Whilst undoubtedly there is continued strong growth in mobile data traffic there is also growth / development in other services that utilise the spectrum under consideration in particular the broadcast services utilising the UHF band 470 – 790 MHz. Arqiva are committed to work alongside Ofcom to ensure that the appropriate spectrum rights are secured for terrestrial broadcast services over the long term.

Question 1: Have we correctly identified the future characteristics of mobile data demand?

Response:

Yes, Ofcom has set-out the main characteristics that will impact mobile data demand in the future. However, one aspect that we believe is also worthy of consideration is the extent to which data traffic is truly mobile, i.e. whilst the data may be received by a mobile device (smartphone or tablet) the device may be static and ideally served via an offload arrangement utilising Wi-Fi or small cells.

Against the specific considerations identified by Ofcom Arqiva make the following observations;

Growing Demand for Mobile Data

We would like to highlight the challenge of accurately predicting data growth forecasts with multiples between scenarios easily 15x[1] and the need for recent adjustments to such forecasts by Cisco[2,3] to take account of traffic offload to Wi-Fi networks. Forecasting is an inherently risky business and we encourage Ofcom to be pragmatic in its use of forecasts to avoid the risk of regulatory failure. In particular Ofcom needs to factor into its decision making:

- the uncertainty over the timing and speed of any growth in mobile data demand; and
- the interconnectedness of technology, infrastructure and spectrum when it comes to addressing any growth.

To this point a recent study[4] undertaken for the European Commission has further emphasised the role of Wi-Fi offload in the provision of traffic to mobile devices which further highlights the importance of ensuring that the usage characteristics are well understood.

[1] Real Wireless 2012, http://www.ofcom.org.uk/static/uhf/real-wireless-report.pdf, p. 28, urban high vs low
[2] Cisco VNI Mobile Forecast, 2010
[3] Cisco VNI Mobile Forecast, 2013
[4] Study on impact of traffic offloading and related technological trends on the demand for wireless broadband spectrum, study undertaken by Wik and Aegis for European Commission, 2013

End user mobile broadband

We endorse the observation made by Ofcom that growth in mobile data traffic is being driven by consumer adoption of data enabled devices and the subsequent use of data hungry applications. In particular we agree that video is likely to be the most data hungry application. However, the logic that supports sustained growth trends beyond widespread consumer adoption of data enabled devices needs to be revisited to take account of economic factors, i.e. cost / willingness to pay and the context, i.e. both the time available and location in which the consumer utilises the mobile data services. When it comes to video this points towards supporting additional "nomadic"[5] offloading solutions rather than pure mobile.

Machine to Machine (M2) Communications

Undoubtedly there will be a growth in the total traffic to M2M systems in the future, but it is too early to know what type of applications will be developed and whether higher bandwidths will be needed on a ubiquitous basis for these services. However we agree with Ofcom when it says "Compared to mobile broadband consumption, projected per-connection M2M data volumes, possibly with the exception of video surveillance, are likely to be low and can sometimes be scheduled off peak" (para 3.13.). In light of this it is not clear that there is the need for additional spectrum in this area beyond the existing licensed and licence exempt bands.

Arqiva is active in the Smart Metering sector and have demonstrated the potential to connect to underground meters. There is clearly the need for the appropriate spectrum to facilitate such connectivity solutions, although it is also worth noting that the bandwidth required is also small, with low latency requirements. We are very happy to work with Ofcom to ensure that the appropriate spectrum is made available to these services.

Indoor Fixed Wireless (Wi-Fi)

We support Ofcom's observations that Wi-Fi plays an important role in the provision of offloading capability and also for connected devices in the home but also note the extensive use in commercial premises. It should also be noted that there is a large proportion (perhaps more than 80%) of popular mobile devices such as tablets and e-book readers that only use Wi-Fi for connectivity due to the high incremental cost for 3G/4G connectivity, demanded by manufacturers and mobile operators. These users would not benefit from additional mobile spectrum, but will drive the demand for more Wi-Fi capacity.

The role of additional spectrum for Wi-Fi purposes is well understood and has been emphasised by the recent study undertaken for the European Commission. To this end additional spectrum has been identified at 5 GHz to enable 5150 – 5925 MHz to be made available for Wi-Fi purposes and this is the subject of ongoing discussion / development within the WRC-15 technical process. This is clearly a major band of interest to support mobile data traffic growth in the future and has the potential to facilitate future mobile data traffic growth. In addition, there are technical enhancements to Wi-Fi systems such as Hotspot 2.0 which will make these systems even more useful and likely drive more traffic to this spectrum

However, in addition to the need for more spectrum to deliver Wi-Fi services indoors this spectrum is also critical to outdoor Wi-Fi systems, the European Commission study noted

[5] In the Wik Aegis report for the European Commission they defined offloading as "nomadic" and macro-cellular as "mobile."

the growing importance of public WiFi systems in urban areas. Arqiva are very active in the deployment of such systems having secured the rights to deploy services in 10 London boroughs, Manchester, Southampton and other local authorities in 2013 and see public Wi-Fi systems playing an increasingly important role in the provision of high bandwidth services to mobile devices going forwards.

Finally, shared spectrum use also has a role to play in the delivery of data rich mobile services. Ofcom has considered this aspect in its recent consultation, 'The future role of spectrum sharing for mobile and wireless data services - Licensed sharing, Wi-Fi, and dynamic spectrum access.' We encourage Ofcom to take into account our response to that consultation but more specifically take account of the delivery of mobile data services by shared spectrum in future assessments of spectrum requirements.

Fixed Broadband

The UK Government is actively engaged in a process to fund the roll-out of super-fast broadband to user premises, both private and commercial, in rural areas. A recent assessment[6] of the progress of this initiative and anticipated final roll-out achievable suggests that 95% of UK households will have access to super-fast broadband by the end of 2018. On this basis circa 5% of UK households will not have access to the fixed super-fast broadband solution and these households will be dispersed across the UK. Furthermore. the government has committed to delivering a universal 2 Mbps broadband service to all households by 2017 but it has not indicated that any additional spectrum releases are necessary to achieve this objective. Whilst wireless has a potential role to play in delivering services to these households it is important that UK spectrum policy / strategy should not solely be determined by the communication needs of this community.

In addition, there is scope for Wi-Fi and / or small cells to be cost effectively deployed in rural areas to enable connectivity, e.g. the deployment of Wi-Fi to holiday camp sites, as Arqiva has done for some of its customers.

Overall, Government objectives to deliver broadband to all appear to be supported within existing initiatives and do not depend on additional spectrum being made available.

Summary

Ofcom has identified the key characteristics but we encourage them to explore in more detail the likely consequences of the characteristics and how they may change over time. In particular we encourage Ofcom to appraise the forecasts which are available taking account of additional factors such as economics of provision and also time available for consumer interaction. In addition we emphasis the key role played now and in the future of licence exempt spectrums, i.e. Wi-Fi and shared spectrum access.

Question 2: Do you agree that there is a prospect of significant continuing growth in demand for mobile data services?

Response:

We are encouraged that Ofcom continues to consider / challenge growth forecasts for mobile data and whilst we do anticipate that there will be continued strong growth in mobile

[6] International benchmark of superfast broadband, report for BT prepared by Analysys-Mason, 27 November 2013, p11. http://www.analysysmason.com/About-Us/News/Press-releases1/UK-EU-superfast-broadband-Nov2013/International-benchmark-of-superfast-broadband-/

data traffic at least for the medium term the nature of that traffic and hence identification of the appropriate frequencies is more difficult to determine. To this end we encourage Ofcom to maintain an open mind and further develop its understanding of future demand and the characteristics of supply to better optimise the spectrum assets required. For example, actual usage data suggests that more than 50% of total traffic on a mobile network is concentrated in less than 5% of the geographical area served, which also show the highest growth rates (e.g. very dense urban areas). Such concentration of traffic seems to be best served with localised capacity enhancements (e.g. Wi-Fi or Small Cells on >2GHz spectrum), instead of letting valuable <1 GHz "coverage" spectrum "go to waste" in the majority of the country. Hence we do question the evidence that supports Ofcom's observation for additional spectrum for mobile data in the UHF band (470 – 694 MHz) in the post 2025 timeframe. This appears to be contrary to Ofcom's recent statement[7] which was re-iterated in the International process[8] where DTT provision is considered important through to 2030.

In addition, Ofcom need to consider the interaction between spectrum, technology, infrastructure and public policy objectives across all communications sectors when determining future spectrum requirements.

Finally, it is worth noting as highlighted in response to Question 1 the increasing importance of WiFi spectrum in the delivery of content / data to mobile devices. We urge Ofcom to engage pro-actively in the International process to ensure adequate provision of licence exempt spectrum both now and in the future.

Question 3: Have we identified all the challenges in realising future growth in citizen and consumer benefits from use of mobile data services and do you have any comments on the nature or the scale of the challenges we have identified?

Response:

Arqiva notes that Ofcom has identified the main challenges, we emphasise the potential expansion in the role of unlicensed spectrum use in the future most notably Wi-Fi as described in response to Question 1. Furthermore, we encourage Ofcom to consider the economic drivers that will underpin service provision over the long term. In particular there may be an economic rationale to the roll-out of new sites and dedicated networks, e.g. to support M2M services in less densely populated areas rather than the deployment of additional spectrum. In particular the delivery of automotive M2M applications may be more effectively served via network roll-out rather than the deployment of more spectrum merely to support this application. We encourage Ofcom to consider the economic aspects of provision in its evaluation process

Question 4: Have we correctly identified all the areas where Ofcom has a role in addressing the challenges of growing demand for mobile data services?

Response:

Ofcom does not refer to the specific, and important, role that it has to play in the roll out of mobile infrastructure. In particular the role that it plays in assessing and giving directions in relation to the Electronic Communications Code. Ofcom says "the Code is designed to

[7] Securing long term benefits from scarce low frequency spectrum, uhf strategy statement, 16 November 2012, Ofcom, http://stakeholders.ofcom.org.uk/binaries/consultations/uhf-strategy/statement/UHF_statement.pdf
[8] UK's national statement on securing the future benefits for the UHF spectrum, UK input to 2nd TG6 meeting, 3-5 December 2013, Lisbon, Portugal.

facilitate the installation and maintenance of electronic communications networks"[9] and as Ofcom note in this consultation network deployment is a key challenge in meeting mobile data demand. In addition, Ofcom will be aware of the proposed directive of the "European parliament on measures to reduce the cost of deploying high-speed electronic communications networks"[10]. This explicitly covers masts, antenna installations, towers, etc., as well as wireless in-building installations. While the detail is still to be finalised it is intended to come into force in 2014 and has a dispute resolution role for Ofcom (as the national regulatory authority).

In addition to the above observation it is also worth emphasising that where a particular band is ideally suited and released for the provision of wireless broadband services to rural areas then Ofcom should apply coverage obligations to all frequency blocks released, e.g. rather than just one block of the 800 MHz band having coverage obligations that all blocks should have included coverage obligations to maximise the policy impact of the release of this spectrum

Question 5: Do you agree that the main additional area that our mobile data strategy needs to address is in relation to potential future spectrum options?

Response:

No. In addition to the identification of future spectrum options we also see merit in Ofcom securing the efficient use of existing spectrum assets over time which would include the re-farming of spectrum to new more efficient technical systems, e.g. the potential re-farming of 900 MHz spectrum from GSM / GPRS systems to the latest LTE based standards.

Furthermore, as noted in our response to question 4 there is a significant piece of work that Ofcom needs to do in relation to mobile infrastructure. What this highlights is that to consider the spectrum demand associated with any increase in mobile data traffic should be explicitly examined alongside anticipated technology enhancements and infrastructure availability. In addition spectrum options must be looked at in relation to adjacent policy initiatives. To give a specific example, Ofcom acknowledge in the consultation that there are no mobile data capacity constraints where Wi-Fi is present. When Wi-Fi adopts the technological development of Hotspot 2.0 and the government's commitment to universal 2MBps broadband by 2017 it suggests that the mobile data capacity concerns that underpin this consultation will largely be met. This certainly suggests that Ofcom should not be looking at potential future spectrum options for mobile data that require the displacement of existing services.

Question 6: Is Ofcom doing all that it needs to do in other areas identified as being relevant to the mobile data challenge?

Response:

In the process of evaluating additional bands for the provision of future mobile data traffic there is the risk of a destabilising effect to existing uses / users that may compromise investment and innovation. We encourage Ofcom to consider this aspect in the process of identifying future bands for consideration.

[9] Para 2.1 http://stakeholders.ofcom.org.uk/binaries/consultations/city-fibre/summary/condoc.pdf (accessed 22 January 2014)
[10] http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2013/0080(COD)

In addition, where bands are currently heavily utilised by a high value use it is important that Ofcom consider the implications to incumbent users' and consumers' in any future displacement to enable mobile data services.

In the case of the 700 MHz process, if it is decided that this band should be cleared of broadcast services in the medium term, then we see merit in the conversion of the entire DTT platform to DVB-T2 operation at the same time. In addition to preserving the current strong level of inter-platform competition, DVB-T2 would provide Ofcom with additional flexibility in the international spectrum negotiations necessary before DTT could be displaced from 700 MHz which, in turn, may reduce the risk of any delay from that quarter in the re-use of 700 MHz for mobile broadband.

To minimise the consumer disruption that may result from a conversion to DVB-T2, Ofcom should work with Government to secure an environment where only DVB-T2 enabled devices are sold into the UK market from potentially 2015 onwards, consistent with an approach already adopted in Italy.

We have earlier noted the importance of Ofcom's role on infrastructure availability to underpin the future delivery of mobile data services. It is also clear that network costs are reduced if infrastructure is shared and a well functioning competitive market for wholesale wireless infrastructure access is a key element of this. In relation to this the Electronic Communications Code has been reviewed by the Law Commission and their recommendations are being considered by DCMS.

The first paragraph of Ofcom's consultation states (emphasis added):

> *"The objective of our mobile data strategy is to identify and prioritise actions which Ofcom could undertake to facilitate the continued long term growth in consumer and citizen benefits from increasing use of mobile data services. In doing so we recognise that* ***increases in the efficiency of delivering mobile data services, particularly through technology and network improvements, will be important*** *for minimising the impact of this growth on other services."*

If Ofcom is to support this increased efficiency in the delivery of mobile data services it will need to ensure that the proposed introduction of a new Electronics Communications Code and the proposed European Directive do not harm the widespread provision of services to mobile phone users, particularly in rural areas, through unintended adverse impacts on the competitive market for communications infrastructure access, and the incentives for long term investment in this sector.

Question 7: Do you agree with our high-level assessment of likely technology and topology trends and their implications for future spectrum use? We are particularly interested in views on:
a) the potential demand for spectrum above 10 GHz;
b) the potential impact of integrating broadcast capability into mobile networks;
c) whether the technical and commercial challenges of supporting additional frequency bands in mobile devices drives interest towards bands close in frequency to existing bands;
d) the relative importance of large contiguous blocks of spectrum versus aggregation of smaller blocks

Response:

Yes and in the context of topology there may be benefits to the deployment of Wi-Fi and / or small cell solutions to less populated areas which would be worthy of further consideration.

(a) We note the potential use of frequencies above 10 GHz and scope for much larger frequency blocks being allocated to support higher bandwidth services. Hence we support further evaluation of these frequency bands.

(b) To date the integration of broadcast services into mobile networks has been limited to LTE eMBMS systems deployed in a 'hot spot' type model to live events in the US. We note that in Europe this aspect is being considered within the work of CEPT Task Group 6 specifically in the context of the broadcast UHF band and we know that Ofcom is active within this group. Clearly, the delivery of broadcast services via mobile networks should not be confined to a particular frequency band but rather be optimised across all relevant bands deployed for the mobile broadband data service.

Furthermore, one of the major challenges to the efficient delivery of broadcast content to mobile devices is the functionality of the consumer device itself. In particular, for the most efficient delivery of broadcast content broadcast standards should be utilised, i.e. DVB-T2, as they are considerably more efficient than the most advanced 3GPP equivalent. Existing mobile devices do not contain the relevant chip sets necessary to support DVB-T reception and hence this is one reason why broadcast systems have not been deployed to deliver services to mobile devices. A second reason is the lack of economic benefit to such a deployment – a significant amount of effort was invested by industry in the last decade in the development of mobile TV solutions but the over-arching conclusion was that there was no commercial driver for such a service.

Finally, broadcast content consumption both now and for the foreseeable future is predicted to be dominated by linear content to large screens and hence there is no obvious consumer demand to support such a development.

(c) Frequency bands should be identified on the basis of their ability to support demand in light of existing assets that are already in service. However, in the case of lower frequency spectrum there are inherent issues with the integration of such frequencies into the device, i.e. antenna characteristics, and such issues should be considered when identifying appropriate bands.

(d) Whilst there is merit in having larger contiguous blocks available to optimise device design and bandwidth capability, this should not be a major driver of spectrum strategy and result in the displacement of incumbent high value services, i.e. the 700 MHz band, Particularly when the blocks are then subject to regulatory break-up to support competition objectives and hence any efficiency benefits are subsequently lost from the final service.

There also needs to be an adequate balance of spectrum assets, both high and low frequency, to support specific usage characteristics.

Question 8: Is Ofcom doing all that it needs to do in other areas identified as being relevant to the mobile data challenge?

Response:

Where incumbent services may be impacted by proposals being developed by Ofcom to support future mobile data traffic requirements, they should take account of the potential growth opportunities associated with incumbent services, i.e. DTT in the 470 – 790 MHz range. In particular, where there is an anticipated displacement of such a service Ofcom should consider what steps are necessary to future proof what will remain of the service. In the case of DTT this could include a conversion of the entire DTT platform to the DVB-T2 standard if a displacement out of the 700 MHz band is required, thus offering scope for additional HD and potentially UHD services in the future and thus sustaining competition within the provision of broadcast services in the UK market.

Question 9: Do you agree with the short list of bands we have identified for more detailed consideration?

Response:

No.

The identification of the UHF band (470 – 694 MHz) against the Medium category appears to overlook the fundamental dependence of DTT on this spectrum for its provision, in particular the public policy benefits of universal coverage and access free at the point of consumption for the foreseeable future. Whilst Ofcom has acknowledged this point the implication of including it is that the significant benefits that are currently realised by UK consumers and complimentary users can be somehow addressed. This has not been substantiated and we encourage Ofcom to do this before including in such a list.

Furthermore, the suggestion in 6.9 that this band may be subject to co-primary mobile allocation and identification for IMT at WRC-15 is of grave concern across the broadcasting industry including the creative sector as a consequence of the impact this is likely to have on future investment in and innovation of the DTT platform both in the UK and across Region 1. Ofcom has a responsibility to defend / protect UK interests and this is a clear opportunity for them to show leadership in the international process. Fundamentally, the potential co-primary allocation is specific to Region 1 only. There may be a few countries in Europe that do not depend on DTT as extensively as the UK and hence may support a co-primary allocation to afford flexibility. One such country is Germany[11], who have recently re-emphasised their commitment to DTT. Moreover the African Nations[12] in Region 1 have recently completed a frequency plan for the whole continent that depends on the frequency range 470 – 694 MHz. We urge Ofcom to work with its international partners to secure the long term access in Region 1 to the 470 – 694 MHz band for broadcasting purposes on a primary basis only.

In general until the implications on capacity of future technology enhancements, infrastructure availability and the implications of more spectrum for Wi-Fi offload are understood it is premature to be looking at spectrum options that involve displacing existing services.

[11] AI 1.1 – Frequency bands proposed to be considered further, German input to CPG-15- PTD#5, Rome, 13-17 January 2014, p. 2 'Not supported frequency ranges, 470 – 694 MHz'
[12] CPG15(13)024 Annex IV-34, section 6.2, Zagreb, 23rd - 26th September 2013

It also worth noting that the potential for LTE-Advanced to use augmented downlinks means that, if technology refreshes and additional infrastructure investment were to prove insufficient to satisfy growing mobile data demand, then in identifying additional spectrum Ofcom need not be solely seeking blocks sufficiently large to provide symmetrical up- and downlinks plus a centre gap.

Question 10: Do you agree with our methodology for prioritising potential bands for mobile data use?

Response:

No it is clear from the assessment that whilst Ofcom has attempted to evaluate the issues with the incumbent services in terms of displacement there is no attempt to consider the value that the individual bands may provide to mobile data services once available.

Different spectrum bands have different technical characteristics and so they will address elements of the challenges identified in section 3. Having identified these as the issues Ofcom should base the prioritisation on these and in particular Ofcom's duties. Put simply Ofcom should prioritise bands based on which will provide the highest net benefit to UK's citizens and consumers. If this does not provide a clear answer Ofcom should look to its secondary duties of ensuring the optimal use of spectrum and the availability throughout the United Kingdom of a wide range of television and radio services.

In the case of the 470 – 694 MHz band Ofcom has noted earlier in the consultation that in the future higher frequencies may have greater significance than lower frequencies but this has not been taken account of in this assessment. Furthermore, in describing the benefits and costs that Ofcom has considered as part of its prioritisation exercise the interests of consumers (which is Ofcom's principal duty) are not adequately taken into account. For example, when considering the 470-694 MHz band Ofcom spend eight paragraphs looking at technical questions and then note in the last sentence that "Clearly the overall cost of these scenarios could be significantly higher than the estimates above once the wider impacts on consumers, PMSE users and white space devices users are taken into account." As a result it is clear that Ofcom has not considered the interests of consumers when considering which spectrum bands to look at

Question 11: Do you agree with our provisional assessment and the results of our band prioritisation?

Response:

No.

As we have noted already in our response to question 10. We are concerned that Ofcom has in the process of trying to adopt a framework to compare bands has overlooked the inherent differences in the characteristics and usage of those bands today. In the case of the 470 – 694 MHz band Ofcom has down played the cost side of the assessment by classifying High as £500m + when the actual cost is potentially of the order of £2bn + when all aspects are considered. Furthermore, for the same frequency range Ofcom has considered coverage characteristics as High when in reality this will be a function of the nature of service deployment alongside other frequencies and impact may be graduated across different service environments, i.e. urban, sub-urban and rural. Finally the relative capacity ranges proposed seem low particularly in light of the importance noted for larger bands to support higher bandwidth services.

Question 12: Do you agree with the possible timelines we have identified in this section?

Response:

With regard to the 470-694 MHz band there is an inherent inconsistency between the information contained within the tables and that depicted in the capacity graphs. In particular, table 7 suggests that this band could be available around 2030 whilst the graphs imply that this will all be utilised by 2030 clearly this is impractical as existing systems would need to be phased out over time and replacement systems would need to be deployed – this is not an instantaneous event. Furthermore, this gives a false impression of the availability of the 470-694 MHz spectrum from 2025 which is inconsistent with Ofcom's previously stated expectations as referenced in response to Question 2. We encourage Ofcom to address this anomaly.

We have noted earlier in our response the potential future importance of additional Wi-Fi spectrum to support outdoor public Wi-Fi systems and we encourage Ofcom to consider this development in their appraisal of capacity access over time. The current assessment excludes Wi-Fi spectrum and system enhancements thus overlooking the potential importance of timely availability of the additional spectrum under consideration.

Question 13: Do you have any comments on the capacity implications outlined in this section?

Response:

Ofcom has overlooked the significant future contribution of Wi-Fi, and perhaps White Space systems, in the delivery of mobile data services, without the Wi-Fi contribution being referenced in the table then the relative future contributions of the bands are overstated. We encourage Ofcom to consider the impact of Wi-Fi and potentially WSD systems in its appraisal of the options.

While we agree that small cells will play an important role in the future, Ofcom do not justify why they see the growth of macro sites as being only 1% a year. Ofcom note[13] from recent evidence that operators' macro cell networks grew at an annual rate of between 5% and 16% between 2006 and 2011. Ofcom then justify reducing that to 1% by stating "However during this period networks were deploying a large number of sites to meet demand for 3G services and as mentioned above past experience may not be a good indicator for future growth in this case." Ofcom's entire Mobile Data Strategy Consultation is based around an expectation of rapid growth in demand for 4G services. This is the central justification for the need for additional spectrum therefore there must also be an associated expectation that mobile operators will continue to develop and augment their networks to support the growth in demand - spectrum and infrastructure are direct substitutes. If Ofcom believe that Mobile Operators will not roll out new sites (points of presence) / extend their service footprint rapidly in line with traffic growth then they cannot simultaneously argue that there is a need for additional spectrum.

In light of this the Mobile Network Operators actively manage their network footprint and capacity to service traffic. This ability to adjust network capacity needs to be fully taken account of in any assessment of the need for additional spectrum.

[13] Para A7.50-1

Question 14: Do you agree with the next steps we have identified for further domestic work based on the proposed priorities?

Response:

The general approach seems sensible but specifically we encourage Ofcom to revisit their approach to co-primary allocation of the 470 – 694 MHz band as noted earlier in our response. There is no compelling event that requires a co-primary arrangement to be adopted for Region 1 at WRC-15 and there is considerable interest from many administrations in Region 1 for a continuation of a primary allocation only. In the context of an agenda item whose purpose is to find additional spectrum for mobile a co-primary allocation is not merely an enabling mechanism it is a deliberate signal to investors, manufacturers and services providers.

Question 15: How do you think we should adjust our support for international harmonisation based on our proposed priorities?

Response:

As noted in response to Q. 14 above we encourage Ofcom to focus its efforts at avoiding a co-primary mobile allocation and identification for IMT at WRC-15 for the band 470 – 694 MHz.

Furthermore, as outlined in Arqiva's consultation response we believe that significant additional work needs to be undertaken to support / justify the level of importance and impact of the 470 – 694 MHz band to mobile data as defined in this appraisal.