

UK Broadband's Response to Ofcom's consultation on improving consumer access to mobile services at 3.6 – 3.8 GHz

Introduction

We welcome Ofcom's consultation on expanding access to 3.6 – 3.8 GHz spectrum. This consultation comes at a particularly opportune time, since the RSPG published its Opinion in November 2016 on a Strategic Roadmap for 5G, which identified 3400 – 3800 MHz as the primary band for 5G services prior to 2020.

UK Broadband ("UKB") has 84 MHz of licensed spectrum in this band. UKB uses the spectrum primarily for the provision of Fixed Wireless Access services, but also for the provision of mobile services, fixed links and leased access to third parties.

We agree with Ofcom that this spectrum is suitable for mobile broadband use, both with 4G and, eventually, for 5G-based services of all varieties – mobile broadband, industrial / mission-critical applications and IoT/ M2M.

However, we see no need or justification for Ofcom to move this spectrum within the Mobile Trading Regulations at this time, as the spectrum cannot be fully utilized for mobile spectrum at this time due to co-existence issues with FSS and due to the lack of an eco-system for end-user handsets.

Moreover, we note that future 5G use will require larger blocks of spectrum and will likely lead to the development of new, innovative and disruptive business models. As Matt Hancock, Minister for Digital & Culture has pointed out, the future is fibre and wireless. Fixed/ wireless convergence means that networks are becoming hybridized; old distinctions (fixed versus wireless, fixed wireless versus mobile) are becoming blurred. Ultimately, all networks will be fibre in the centre and wireless at the edge.

Ofcom should ensure that the regulatory framework does not act as a barrier to commercial ventures that might involve forms of spectrum access and sharing in the band that would facilitate competition in the market and maximise utilization of the spectrum.

Question 1: Do you have any comments on the use of the 3.6 to 3.8 GHz band by existing services?

The consultation document explains that the 3.6 – 3.8 GHz band is currently used for fixed links, satellite earth stations and wireless broadband.

UKB's 84 MHz of 3.6 GHz spectrum was originally issued as paired spectrum with 84 MHz of 3.9 MHz spectrum and we hold the two blocks together in one licence.

UKB's licence permits the use of this spectrum for both Fixed Wireless Access (by virtue

of IR 2015.1 and 2015.2 in relation to 3400 – 4009 MHz) and for mobile terminals and services (by virtue of IR 2015.3 in relation to 3400 – 3800 MHz).

UKB originally acquired this licence in 2010 and since that time has invested in the development of this emerging band, deploying trials in technologies such as WiMax as they emerged. UKB (along with its parent company PCCW) founded and chairs the 3.5GHz Interest Group of the Global TD-LTE Initiative¹ and has been committed to driving development of equipment in the wider 3.4 – 3.8 GHz band.

LTE became available in the band from 2012 and UK Broadband decided to prove the use case by building a proof of concept FWA network in London, which would utilize LTE in both 3.5 and 3.6 GHz spectrum. The proof of concept was successful, further network was built and full fixed wireless services on this network were launched in 2014 under the Relish brand.

Since then, the fixed wireless offering has been further refined, the target consumer groups identified and the optimization of these spectrum bands and network configuration has been established. As the world's first operator to use both Band 42 and Band 43 in a combined LTE network, UKB has had to pioneer the use of this technology and the product offering. UKB experiences have been used to inform other deployments around the world.

Since 2014 the London LTE network has expanded out from Central London into additional London boroughs and now covers approximately 400,000 premises (consumer and business). [X]

As the consultation document explains, UKB's 3.6 GHz spectrum is co-ordinated on a co-primary basis with fixed satellite service (FSS) earth stations and point to point fixed links. This means that there are areas of the country (including parts of London) where UKB's use of the band is restricted. The coordination requirements also limit UKB's ability to bid compete successfully for procurements in the enterprise, industrial and public sectors.

Nevertheless, UKB has deployed 4G LTE networks utilising 3.6 GHz spectrum in Wiltshire (Swindon and its outlying villages²), Reading and various other parts of the UK offering services to consumers, SMEs and large enterprises. The spectrum is also leased to third parties under commercial arrangements. Other forms of wholesale access, including use of MOCN technology, are being explored.

[X]

Recent studies undertaken by UKB in cooperation with Arqiva and Ofcom have led to some site-specific relaxation of the protection mechanisms (due to the significant level of

¹ www.qtigroup.org

² UKB Networks successfully bid for the BDUK-funded contract with Swindon Borough Council to deliver superfast broadband to 20,000 homes in the Swindon area.

tree-line protection at Arqiva's Chalfont Grove teleport). This has enabled UKB to begin utilising additional 3.6 GHz spectrum in the London area.

Question 2: Do you agree with our identification of a trend towards the use of mobile in the 3.6 to 3.8 GHz band?

Yes. Since publication of this consultation document, the RSPG has identified 3.4 – 3.8 GHz as one of the building blocks of 5G spectrum³. However, there is no reason why this band should not be used more widely in 4G networks in advance of 5G standards being released. Indeed, as 5G standards may yet be some years away, early deployment of 4G TD-LTE in this spectrum should be encouraged to maximise rapid and efficient utilisation.

Internationally, the 3.6 – 3.8 GHz band (3GPP Band 43) is identified for mobile spectrum. However, the eco-system is far from mature compared with mainstream TD-LTE spectrum. According to the GSA, as at October 2016 there were 87 Band 42/43 devices compared with 1,927 Band 40 devices. Ironically, there is a danger that the development of the 4G eco-system may be held back by the potential for the band to become one of the main frequency bands for 5G, which would be unfortunate. China has also determined to assign B42/43 as 5G band.

As Ofcom states in the consultation document, in the UK mobile use is already permitted in both 3.4 – 3.6 GHz and 3.6 GHz – 3.8 GHz spectrum. However, the limited device availability means that the spectrum cannot yet be used in the mainstream market for mobile services. Once compatible handsets do come to market, this spectrum could be extremely valuable for satisfying consumer demands for data in areas of high demand (such as urban areas), for providing broadband service in remote locations where fixed networks cannot reach, as well as for providing data capacity to trains and highways. Our understanding from Qualcomm and suppliers is that both Band 42 and Band 43 is expected to be supported by all major handsets in 2018/19.

It is worth noting that 5G and 4G-advanced will enable new business models so that the band will be suitable for more than simply traditional mobile phone or mobile broadband usage. Indeed, the business case for 5G mobile is unproven. In particular, the band is likely to be used for ultra-low latency, mission-critical services and massive machine-to-machine connections. Use cases will likely include the automotive sector, factories, energy, media / entertainment and e-health.

Question 3: Do you agree with our high level proposal to make 116 MHz within the 3.6 to 3.8 GHz band available for mobile and 5G services, bearing in mind our statutory duties and the high level trends we have identified?

Yes. Given the CEPT harmonisation of the band for fixed/ mobile broadband and the RSPG opinion on 5G, as well as its suitability for satisfying data capacity demands, it would be sensible for Ofcom to facilitate optimal use of this band by making the

³ http://rspg-spectrum.eu/wp-content/uploads/2016/11/RSPG_News_Release_on_5G.pdf

additional 116 MHz of spectrum available for mobile broadband.

In the medium/ long term Ofcom will have to consider how to facilitate access to this spectrum by a wider group of users than mobile consumers, such as industrial users. Given that 5G utilization will require larger channel bandwidths – in the order of 80 MHz or 100 MHz channels – a traditional “four operator” model may no longer be appropriate. New forms of spectrum access and spectrum sharing technologies will need to be considered in order to make the spectrum available to different kinds of users. MOCN is an obvious enabling technology that could bring new players to the market through shared network agreements.

Question 4: Do you agree with our general approach regarding spectrum currently licensed to UK Broadband?

Annual Licence Fees

Ofcom states in Section 7 that it will consider reflecting the opportunity cost of mobile use in the fees UKB pays for its spectrum. UKB agrees that, to the extent that the spectrum can be used for mobile services, the licence fees payable should reflect that.

However, there is currently no “opportunity cost” because this spectrum is not yet fully equivalent to mobile spectrum for two reasons:

- i) the co-existence issues mean that it cannot be used in certain locations; and
- ii) there is no device ecosystem yet for mobile handsets (smartphones).

So it would not be appropriate to impose mobile-level licence fees today. Once the user equipment becomes available it may then be appropriate to adjust the licence fees to reflect the opportunity cost of mobile use, to a greater or lesser extent depending on the extent to which co-existence issues and co-ordination requirements remain and limit utilisation.

Based on the experience of previous spectrum awards (and given Ofcom’s intention to auction 2.3 and 3.4 GHz spectrum in 2017 and 700 MHz spectrum in 2018 or 2019) it is unlikely to be practicable for Ofcom to hold an auction for the award of this 3.6 GHz spectrum before 2019. The release of this spectrum is therefore quite likely to coincide with the widespread availability of smartphones compatible with the band. It would therefore be possible to derive an Annual Licence Fee from the auction values, in the same way as the ALF for UKB’s 3.4 GHz spectrum (from 2018 onwards) will be derived from the auction values.

Mobile Trading Regulations

Section 10 of the consultation document sets out Ofcom’s plan to bring the 3.6 – 3.8 GHz band (including UKB’s 3.6 GHz spectrum) under the Mobile Trading Regulations. In the event that Ofcom does decide to make the remaining 116 MHz available for future mobile services through an award, then we agree that it would be appropriate to bring UKB’s spectrum under the MTRs in advance of that award. However, until mobile handsets are widely available, and some or all of the FSS co-existence issues have been resolved,

there is no possibility for a trade of this spectrum to distort the market and affect downstream competition. It would therefore be premature to bring UKB's 3.6 GHz spectrum under the Mobile Trading Regulations at this time.

Harmonisation of licence conditions

In Section 7 Ofcom further explains that it will consider "harmonising UK Broadband's spectrum licence's coordination obligations with the potential obligations associated with potential future mobile networks operators in this band. This could effectively mean lifting or changing the coordination requirement from UK Broadband's use of 3605 – 3689 MHz band."

At the moment, UKB's use of the spectrum is co-primary with fixed satellite service (FSS) earth stations and point to point fixed links the satellite users, so there are coordination requirements. Ofcom's intention is to remove those obligations on UKB if, and to the extent that, they decide to do so for other future mobile users in the band. We would of course agree with this proposal. UKB's 3.5 GHz licence was varied to bring it into line with the licence conditions proposed for the other licences to be awarded in next year's auction and it would make sense for a similar exercise to take place with 3.6 GHz spectrum.

Leasing and Sharing

UKB's 3.6 GHz licence currently permits leasing and UKB has various lease agreements in place with third parties. Express permission to lease spectrum is not currently contained in mobile spectrum licences as this could be used as a mean to circumvent imposed competition measures such as spectrum caps.

In view of the much wider channel bands that are required for the provision of high speed data services and for 5G services, we think that Ofcom should be open to the possibility of spectrum leasing and other forms of network sharing in bands that are released in future. Given the size of the blocks that operators are going to need, Ofcom should not let regulatory restrictions stand in the way of commercial agreements which seek to enable operators to get the maximum use of spectrum by sharing access. Such commercial deals, as have been seen in other countries, can encourage innovation and market entry.

Whereas mobile regulation to date has sought to encourage wide-area coverage for the provision of mobile voice services, networks of the future will need to mix low frequency "coverage spectrum" with higher frequency "capacity spectrum". This means that a "one size fits all" approach to network deployment and service provision may no longer be appropriate and new forms of business model will emerge.

One form of network sharing which HKT has used to good effect in Hong Kong utilises Multi-Operator Core Network (MOCN) technology. We are enclosing with our response a report recently produced by Plum Consulting which examines the efficiencies which can

be gained from the deployment of MOCN technology⁴.

Question 5: Do you agree with our assumptions, methodology, and conclusions with regards to potential coexistence between mobile and existing fixed links and satellite earth stations? Please refer to annex 5 for further details.

We think that the technical parameters in place are quite cautious and that work could be done to reduce the area that is taken up by FSS use. We note that deployment of small cells in this band, with lower noise emissions than macro cells, could reduce coordination issues.

Question 6: Do you have a view on any of the two options we identified?

Ofcom puts forward two contrasting policy options:

- a) *retain* existing users' current authorisations for fixed links and FSS earth stations; and
- b) *remove* existing users' current authorisations for fixed links and FSS earth stations.

Whilst our preference would obviously be not to have to co-ordinate with other users, UKB believes that there may be scope for a more pragmatic "middle way" approach.

This could involve:

- i) FSS earth stations affecting areas of high population density/ high mobile data demand could potentially be closed down, whilst FSS earth stations in sparsely populated areas could be allowed to remain and where wireless broadband services are not required because fixed line networks provide adequate broadband services for residents. However, the two may still be incompatible because sparsely populated areas are likely to be the areas most in need of wireless broadband service and, moreover, satellite earth stations can cast a long shadow, affecting locations a considerable distance away;
- ii) Access in co-ordinated areas could be database driven, with accurate modelling and state-of-the-art mapping information enabling deployments in as many areas as possible, without imposing blanket and overly cautious exclusion zones.

⁴ "Review of efficiencies with MOCN technology", Plum Consulting, November 2016