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techUK response:
Ofcom's consultation on Public Sector Spectrum Release (PSSR)

technical coexistence issues for the 2.3 and 3.4 GHz award

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techUK | Representing the future

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About techUK

techUK represents the companies and technologies that are defining today the world that we will live in tomorrow. In a very real sense techUK represents the future.

At the heart of tech in the UK is an ecosystem of 270,000 companies producing digital technologies, products and services. From east to west, north and south, from enterprise class organisations to established medium-sized businesses, growing small businesses and an exciting generation of tech start-ups: the UK is a hotbed of tech talent and techUK exists to represent the sector in its entirety.

Our role as techUK is to ensure that we seize the potential for good and address the disruptive new challenges that change and innovation always present. We work to understand the opportunities that technology provides; to support the companies and innovators that can realise those opportunities.

This underpins our simple vision to ensure that tech is good for the UK, the UK is good for tech and that tech is good for people.

Introduction

techUK is pleased to provide its views to Ofcom on the issues raised in this latest Ofcom consultation on the proposed award of 2.3 GHz and 3.4 GHz spectrum. This technically focused consultation with its annexes and associated independent technical studies has been considered by our members who have an interest and expertise in the matters addressed.

The material provided by Ofcom is very extensive and we are not in a position to respond in detail to all of the 42 consultation questions. Instead we have focused on the most important aspects that have been identified by our members when reviewing the materials that Ofcom has provided.

Summary

TechUK supports the initiative taken in the UK to release underutilised public sector spectrum and specifically these spectrum bands for mobile broadband applications. These new bands will contribute to the Digital Britain targets and being consistent with the wider European activities to harmonise their use across the EU and CEPT for mobile broadband applications, will be beneficial to UK consumers. As such techUK is keen to ensure the success of the release without delays to the associated timescales.

At the same time, techUK recognises the adjacency between the 2300-2400MHz band and licence-exempt services in the 2.4 GHz band. The main issue in this context, for techUK, is that of potential compatibility problems that may arise between future 2.3GHz LTE networks and WiFi systems that operate in the 2.4 GHz band. techUK welcomes the extensive work done by Ofcom and its consultants to better understand this issue and considers that in view of the very extensive reliance on WiFi technologies by UK consumers there must be a high degree of confidence that unacceptable interference problems will not occur following the roll out of new 2.3GHz LTE technologies.

For example the risk of interference occurring is focused on consideration of "typical" WiFi devices and mainly addresses interference from LTE base stations. As indicated in some of the supporting studies the potential for interference to WiFi from LTE terminals is likely to be highest when they are located in the same room. The mitigation techniques appear to rely heavily on change out of WiFi equipment to introduce better filtering or use of the 5GHz bands rather than 2.4GHz. With blocking identified as the main interference mechanism all 2.4GHz WiFi channels are similarly affected. The replacement cycle of ISP-supplied WiFi routers means that the majority of this equipment will eventually be 5GHz capable, but this may not universally be the case. Similarly, the use of wired alternatives to WiFi will not be universally feasible.

techUK encourages Ofcom to undertake limited further analysis (including a fuller range of performances of Wifi devices), looking in particular at the probability of 2.3GHz LTE UE interference to WiFi. Some members also have suggested an investigation of reducing the LTE transmit power level in the band 2380-2390 MHz. These studies should not delay the timescales for the spectrum release. The Q3/ 2015 timescale set for this release makes this feasible.

Once Ofcom has had the opportunity to study the various responses to this consultation, techUK stands ready to work with it, in bringing the interested industrial communities together, and to help frame the supplementary studies needed.

Responses to individual questions

Question 4.1: Do you agree with our proposal to conduct a market led award through an auction process for licensed use of the 2.3 and 3.4 GHz bands? If not, please provide evidence to counter this proposal.

An auction is not the only available means of awarding the spectrum, but is considered appropriate if Ofcom is proceeding with packaging the spectrum into several blocks along the lines set out in the earlier call for inputs.

Question 4.2: Do you agree that we should not offer arrangements for aggregate bidding for low power use for these release bands? If you believe we should make such arrangements, please provide supporting evidence.

techUK considers that small cells for capacity and other low power use may be of interest as well as more traditional higher power use.

Question 6.1: Do you have evidence to challenge our methodology and assumptions, which show the number of Wi-Fi routers likely to be affected by LTE interference is low?

Question 6.2: Do you have evidence to challenge our methodology and assumptions, which show the number of Wi-Fi client devices affected by LTE interference is low?

In response to these two questions techUK notes that the claimed low probability of interference is based on considering the "median" performing WiFi devices that were tested and was based on interference to WiFi from LTE base stations. The risk of interference from LTE UE devices was not quantified. Further consideration of the risks of interference from a range of WiFi devices (ideally weighted in proportion to market penetration) and with the probability of UE to WiFi (AP and client) interference would be informative.

It seems likely that the 2.3GHz and 3.4GHz bands could be deployed on new sites (e.g. smaller capacity cells) compared to current network architectures and this may be a different scenario to the one that Ofcom modelled.

Question 6.3: Do you agree with our assessment of the available options for mitigation of interference to home networks?

techUK is in agreement with the range of theoretical mitigation techniques that Ofcom has identified, but some of our members disagree with the assessment that they are universally feasible and acceptable solutions. In this context, the following points have been highlighted within techUK's internal deliberations:

- The coverage of 5GHz WiFi does not match that at 2.4GHz and some devices do not have 5GHz WiFi capability. Thus a move to 5GHz is not universally feasible and could also represent a reduction in overall spectrum capacity for Wifi. However the availability of 5 GHz WiFi equipment will increase in the time between now and implementation of LTE networks at 2.3 GHz in 2016.

- Some members believe that the separation needed to avoid interference between 2.3 GHz LTE and 2.4 GHz WiFi devices, according to calculations can in many cases extend to 10m or more and in such cases the feasibility of increasing separation between devices is questionable (e.g. within a room or on a train)

These implications should be covered in the additional studies suggested in the above Summary.

Question 6.4: Do you agree with our assessment of the available options for mitigation of interference to public networks (both indoor and outdoor)?

Question 6.5: Do you agree with our assessment of the available options for mitigation of interference to Enterprise Networks?

Question 6.6: Do you agree with our conclusion that the impact to Wi-Fi is not of a significant nature and therefore no regulatory intervention is necessary? If not, can you provide evidence?

As discussed above, techUK believes that a limited and well defined set of studies should be undertaken without the timescales for the spectrum release being affected.

Question 7.1: Do you agree that we do not need to perform technical analysis on the applications in the middle of the band as set out in paragraph 7.7?
techUK has no comments.

Question 7.2: Do you agree with our technical analysis in relation to Bluetooth devices operating in the 2.4 GHz band, and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.3: Do you agree with our technical analysis in relation to ZigBee devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.4: Do you agree with our technical analysis in relation to video sender devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.5: Do you agree with our technical analysis in relation to radio microphones devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.6: Do you agree with our technical analysis in relation to short range devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.7: Do you agree with our technical analysis in relation to medical devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.8: Do you agree with our technical analysis in relation to emergency services use in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 7.9: Do you agree with our technical analysis in relation to hearing aids and assisted listening devices operating in the 2.4 GHz band and that no additional restrictions are required in order to protect these applications?
techUK has no comments.

Question 8.1: Do you agree that the available mitigations address the potential shortfall of spectrum for PMSE at major events and that no additional regulatory intervention is necessary to protect PMSE in frequencies adjacent to the award bands?
techUK has no comments.

Question 8.2: Do you agree that PMSE should have some continuing access to spectrum in the 3.4 GHz band until new services are rolled out in an area?
techUK has no comments.

Question 8.3: Which option for the provision of information about the roll-out of new services is most the appropriate? Should the requirement to supply information apply only in designated locations?
techUK has no comments.

Question 8.4: Do you agree that any continuing access should be limited to five years from the award of new 2.3 and 3.4 GHz licences?
techUK has no comments.

Question 8.5: Do you agree with our assessment that there is little incremental benefit in on-going PMSE access to the 2.3 GHz award band?

techUK has no comments.

Question 10.1: Do you agree with our proposal that no coordination procedure is necessary in respect to maritime radar?
techUK has no comments.

Question 11.1: Do you agree with our proposal to require coordination procedures for the 3.4 GHz band - in order to protect of air traffic control radar - in line with those applied to the 2.6 GHz band?
techUK has no comments.

Question 12.1: Do you agree that for mobile satellite services operating in the band between 2170 and 2200 MHz, coexistence with LTE operating in the award bands above 2.35 GHz is unlikely to be an interference problem?
techUK has no comments.

Question 12.2: Do you agree that satellite services operating in the band 2483.5 MHz to 2500 MHz can co-exist with LTE operating in the award bands (i.e. 2350 to 2390 MHz and 3410 to 3590 MHz) and there is unlikely to be an interference problem?
techUK has no comments.

Question 12.3: Do you agree with that for satellite services operating between 2200 and 2290 MHz, coexistence with LTE operating in the release bands is unlikely to be an interference problem?
techUK has no comments.

Question 12.4: Do you agree that for amateur satellite services operating between 2400 and 2450 MHz, coexistence with unwanted/out of band emissions of LTE operating in the release bands (the nearest release band is 2350 to 2390 MHz) is unlikely to be a greater problem than the current in-band interference from licence exempt and ISM uses?
techUK has no comments.

Question 12.5: Do you agree with our preferred option to adopt our proposed mask with informal co-operation on a case-by-case basis if required?
techUK agrees.

Question 13.1: Do you agree with our preference not to have a transitional region between blocks for licences in the 2.3 GHz band?
techUK agrees.

Question 13.2: Do you agree with our preference not to have a transitional region between blocks for licences in the 3.4 GHz band?
techUK agrees.

Question 13.3: Do you agree with our preference to not require synchronisation between different networks in the frequency band?
techUK agrees.

Question 13.4: Do you agree with our preference to include both the permissive (unsynchronised) and restrictive (synchronised) masks within the TLCs in the 2.3 GHz band?
techUK agrees.

Question 13.5: Do you agree with our preference to include both the permissive (unsynchronised) and restrictive (synchronised) masks within the TLCs in the 3.4 GHz band?
techUK agrees.

Question 13.6: Do you agree with our preference to not require synchronisation between different networks in the frequency band?
techUK agrees.

Question 13.7: Do you agree with our proposed maximum in band power limit for base stations in the 2.3 GHz band?
techUK agrees.

Question 13.8: Do you agree with our proposed maximum in band power limit for user terminals in the 2.3 GHz band?
techUK agrees.

Question 13.9: Do you agree with our proposed maximum in band power limit for base stations in the 3.4 GHz band?
techUK agrees.

Question 13.10: Do you agree with our proposed maximum in band power limit for user terminals in the 3.4 GHz band?
techUK agrees.

Question 14.1: Do you agree with our approach that it is not necessary to impose any guard bands or restricted blocks in order to manage the adjacencies between the incumbent UK Broadband and new users of spectrum to be awarded in the 3.4 GHz band?

techUK agrees. In the event that adjacent operators are not synchronised, then the restrictive band edge mask will be applied. If a guard band were also imposed then the spectral efficiency (and therefore the amount of spectrum available to be released) would be significantly reduced. By applying the restrictive mask, Ofcom have in practical terms applied a *de facto* guard-band between non-synchronised operators. On the other hand, for synchronised operators using the permissive band edge mask, the *de facto* guard band is in the time domain.

Question 14.2: Do you agree with our approach to require UK Broadband to have the same coordination requirements as other users of the band?

techUK considers this to be reasonable.

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