

Intel Corporation Response to UK Ofcom Consultation “Improving consumer access to mobile services at 3.6 to 3.8 GHz”

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

Intel Response: Noting the relatively low geographic utilization by incumbents, Intel believes the 3.4-3.6 GHz and 3.6 to 3.8 GHz band, with 400 MHz of continuous spectrum, is ideally suitable for licensed terrestrial mobile 5G applications. 5G is intended to support a wide range of usage scenarios, with various applications having significant differences in the types and amounts of spectrum needed to support them. The maximum benefits accrue through the use of wide channels provisioned to support multiple network operators.

The recently published Radio Spectrum Policy Group “Strategic Roadmap Towards 5G for Europe; Opinion on spectrum related aspects for next-generation wireless systems (5G)”, as detailed in the extract below, clearly places great emphasis on both the 3.4-3.6 GHz and 3.6-3.8 GHz bands.

This roadmap has been developed to facilitate the launch of 5G on a large scale in Europe by 2020. The goal is that the benefits of 5G-based services are available to all European citizens in a timely manner, driving industrial and societal transformation and economic growth in Europe from 2020 and beyond.

- 1. The RSPG considers the 3400-3800 MHz band to be the primary band suitable for the introduction of 5G -based services in Europe even before 2020, noting that this band is already harmonised for mobile networks, and consists of up to 400 MHz of continuous spectrum enabling wide channel bandwidth. This band has the possibility to put Europe at the forefront of the 5G deployment.*

Plus the European Commission in their “5G for Europe: An Action Plan” addressing “Pioneer spectrum bands” state

Member States and the Commission, working together in the Radio Spectrum Policy Group (RSPG), have recognised the importance of the early identification of common EU-wide pioneer spectrum bands to enable 5G take-up as early as in 2018. This is indispensable to give proper guidance to industry and keep the EU on a par with spectrum availability in other regions of the world. This first set of such pioneer bands should include a mix of spectrum with different characteristics to address the versatile 5G requirements. The identified bands should also have a potential for global harmonisation and take advantage of the sizeable amount of harmonised spectrum already allocated in the EU for wireless broadband below 6 GHz. The spectrum mix should include:

- Spectrum between 1 GHz and 6 GHz, where EU-wide harmonised bands are already available and licensed in a technology neutral way across Europe. In particular, the 3.5 GHz band seems to offer high potential to become a strategic band for 5G launch in Europe*

Given the global identification of 3.4-3.6 GHz for IMT, plus the CEPT rules for mobile broadband in 3.4-3.8 GHz, supplemented now by the RSPG 5G Opinion, manufacturers are already developing equipment to operate in 3.4-3.8 GHz. The ability to implement wide tuning ranges in the radio front-end could permit an adaptable form of harmonisation with other countries and regions which are utilizing parts of the same band or adjacent bands for mobile broadband services including 5G.

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?

Intel Response: Yes, Intel fully agrees with Ofcom’s identification of a trend towards mobile use of the 3.6-3.8 GHz band as well as the 3.4-3.6 GHz band. We believe that this is fully aligned with ECC

Decision (11)06 “*Harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the bands 3400-3600 MHz and 3600-3800 MHz*”.

Recognising that ECC Decision (11)06 is currently being revised by CEPT to ensure that the technical conditions for the 3400-3800 MHz band are suitable for 5G usage, we believe the following extracts from that Decision are pertinent and worthy of noting -

The harmonised frequency arrangements for the 3400-3800 MHz band in this ECC Decision are intended to facilitate high data rate mobile/fixed communications networks (MFCN) including International Mobile Telecommunications (IMT) services supported by larger channel bandwidths as an evolution to the existing framework without the consequential requirement for a replacement of systems based on the existing regulatory framework. It aims at providing the basis to the mobile industry and administrations to respond to the growth of mobile broadband and technological developments for wider channel bandwidths and increased data rates.

Since WRC-07, the 3400-3600 MHz band has been allocated on a primary basis to the mobile, except aeronautical mobile, service and identified for IMT in almost all CEPT member countries.

The ECC recognises that implementation of MFCN including IMT systems providing high data rate applications in the band 3400-3800 MHz based on a harmonised frequency arrangement will maximise the opportunities and benefits for end users and society, will benefit capital expenditure for operators, reduce development and implementation costs of manufacturing equipment and will secure future long terms investments by providing economies of scale. A harmonised frequency arrangement will reduce complexity in cross border coordination. The opportunity to utilize larger channel bandwidths will assist the provision of high data rates for IMT (especially with IMT-Advanced).

The ECC recognises that for the continuation of the successful development of MFCN including IMT, the regulatory framework needs to provide the confidence and certainty for industry to make the necessary investment. ECC recognises that administrations need flexibility to adapt their use of the bands 3400-3600 / 3600-3800 MHz to national circumstances. Any transition from legacy systems to future systems would be managed at national level. Such national measures may need to be studied (e.g. re-farming of the band, planning of renewal or extension of authorisations etc.). Moreover, the framework defined by this ECC Decision does not supersede the BWA/FWA framework. Instead, it aims at supplementing this framework to facilitate high data rate services supported by larger channel bandwidths as an evolution to the existing framework without the consequential requirement to replace systems that are based on the existing regulatory framework.

Intel notes that while “*Any transition from legacy systems to future systems would be managed at national level*” we believe that implementation of ECC Decision (11)06 provides an opportunity to secure access to 400 MHz of contiguous spectrum noting the 3.4-3.6 GHz range has been identified for IMT in the ITU Radio Regulations since 2007 and in 2007 the ECC also decided to examine the 3.6 to 3.8 GHz band for IMT. With 400 MHz of contiguous spectrum, the 3.4-3.6 GHz and 3.6-3.8 GHz bands offer a unique opportunity to meet some of the new demands for mobile broadband.

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?

Intel Response: Intel’s preference, as previously stated, is for Ofcom to consider every opportunity to release 200 MHz in the 3.4-3.6 GHz plus 200 MHz in the 3.6-3.8 GHz band thus making up to 400 MHz of contiguous spectrum available for 5G.

While we understand the thinking behind only making 116 MHz available in the 3.6-3.8 GHz band we think that this may limit timely 5G deployments.

Another reason it is preferable to open the entire 400 MHz in a consistent manner is to enable four 100 MHz wide channels within the 3.4-3.8 GHz for 5G usage. So considering the very limited usage of the part already allocated today, we believe Ofcom should do a reassignment of the entire band instead of just adding those portions that are still unassigned.

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

Intel Response: Yes, Intel supports Ofcom's proposals to change the regulatory conditions to UK Broadband's spectrum allocation to align it with the rest of the 3.6-3.8 GHz band.

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.

Intel Response: For sharing conclusions Intel points Ofcom to relevant parts of Report ITU-R S.2368 "Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15", but overall, since Intel supports clearing 3400-3800 MHz from incumbents (see Q6) we do not believe sharing would be a major issue.

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

Intel Response: Intel supports option b) -

Remove existing users' authorisation to transmit for fixed links and no longer take satellite earth stations with a receiver component in the 3.6 to 3.8 GHz band into account for frequency management purposes.

Question 7: Do you have any quantitative evidence on the costs and benefits associated with the options? This include costs for existing users and/or consumers of existing services associated with potential changes, and benefits to UK consumers in gaining access to mobile services in this band.

Intel Response: Intel has not undertaken any quantitative analysis on the costs and benefits associated with either options. Our opinion is based on maximising access to 3.6-3.8 GHz for 5G.

Question 8: Do you have any other suggestions that would allow widespread 5G availability using the 3.6 to 3.8 GHz band across the UK while allowing certainty for at least some existing users to continue to provide the benefits currently provided by use of the 3.6 to 3.8 GHz band?

Intel Response: Intel has no further suggestions.

Question 9: Do you have any comments in relation to these proposals?

Intel Response: Intel has no further comments since we believe our preferences are well represented in responses to the previous questions.