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UK Broadband Limited's response to Ofcom's consultation on technical co-existence issues for the 2.3 and 3.4 GHz spectrum release

UK Broadband welcomes Ofcom's consultation on the technical licence conditions relating to the 2.3GHz and 3.4GHz spectrum bands. UK Broadband has chosen to respond to some, but not all, of Ofcom's questions, as set out below.

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.

We strongly agree. UKB would not support a proposal for aggregate bidding for low power use on a shared basis. Nor would we support the concept of a neutral host network, as we believe this would create a monopolistic structure that would not encourage competition and innovation.

We believe that imposing restrictions limiting the output of certain parts of the spectrum would create competitive distortions. We agree with Ofcom's proposal to permit high power use. This would not prohibit any particular operator from turning the power down and operating at a lower power level should they choose to do so.

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?

UK Broadband considers that operators should provide information about new locations using a headline form of either street address/ postcode or NGR. Operators are required under internal processes to use this information to maintain their estate of sites, so supplying this information externally would not be an unduly onerous task. We would propose that the data should be updated periodically by operators when they install or remove sites.

Ofcom may wish to consider how temporary, mobile or nomadic sites (such as those on trains or other forms of public transport) are treated. Information about these sites could perhaps be held under a separate category heading.

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

Yes, we agree. Maritime radar (10cm band) is limited to its geographic location; ship-borne radars will only be operational when the vessels are entering or leaving port. Moreover, 10cm maritime radars are not effective for short range navigation and so are often turned off when

approaching a port (though the antennas still rotate). Maritime radars use highly directional antennas (within approximately 1 degree) with high back-lobe and side-lobe suppression. Any interference from the land-side bearings will therefore not affect their effective range when scanning the sea-paths or coastal regions.

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?

Ofcom proposes to apply the same pfd per MHz across the 3.4GHz band as in the 2.6GHz band. We agree with Ofcom's proposal. Air traffic control radars may be affected to a greater extent than ship-borne radars as their scanning area encompasses both surface and air and therefore the directionality and lobe suppression available to maritime radars does not apply to air traffic control radars.

In addition, air traffic controllers often employ multi-band radars with the potential for frequency agility to a moderate extent. Potential cumulative interference from the land-based service has the ability to increase the noise floor of the radars, thus reducing its overall range, and also to increase the noise only on particular bearings of the air traffic control radar which will cause variable target acquisition or fade-out of tracking on certain bearings.

UKB is willing to accept the same coordination procedures as are applied to the rest of the 3.4GHz band. We note the coordination procedure which Ofcom has published at Annex 13 and confirm that we will notify relevant radar operators in the event that any relevant pfd thresholds are likely to be exceeded. As Ofcom is aware, UK Broadband is co-operating in a similar manner already with the operators of radars in close proximity to some of its current network installations and will continue to do so.

Question 12.5 - Co-ordination with Space and Satellite Services: Do you agree with our preferred option to adopt our proposed mask with informal co-operation on a case-by-case basis if required?

The increased use of radio spectrum between 3400 and 3600 MHz following the planned award may combine with changes to the technical licence conditions for UK Broadband's spectrum and lead to a slight increase in the risk of interference in certain receivers that historically also cover this band.

Ofcom's blocking analysis suggests that there is some potential risk of interference to PES and ROES operating above 3600 MHz with separation distances up to about 8 km from an LTE base station operating below 3600 MHz.

Taking account of the filters available, Ofcom believes that C-band PES use in the band 3600-3650 MHz might be most affected by the top 20 MHz of spectrum (to 3600 MHz) which is currently licensed to UK Broadband. If a high power LTE base station were installed near to a PES site (operating from about 3600-3650 MHz), then Ofcom's view is that an affected C-band PES may need to install a filter to ensure there are no blocking effects from signals below 3600 MHz and that local site engineering on the LTE site using the top 20 MHz to include antenna discrimination between the two sites could also assist in mitigation.

Ofcom's options in respect of the Band Edge Mask are as follows:

1) Allow UK Broadband to maintain its current mask;

- 2) Adopt Ofcom's proposed mask with informal co-operation on a case by case basis; or
- 3) Adopt Ofcom's proposed mask with mandatory co-ordination procedures.

We agree with Ofcom's preference for Option 2. In our experience local site engineering would indeed be able to resolve any potential interference problems. UKB takes note of the likely changes to the band-edge mask (restrictive and permissive) and the recent publications from CEPT regarding likely standardisation of these requirements across Europe. In the event that local engineering (including reducing the maximum power of certain sectors and changing the azimuth/tilt alignment of UKB antennas which have the potential to cause interference) did not produce the required isolation using the permissive or current UKB mask, then deploying the restrictive mask profile should prove adequate. This would depend, of course, on the performance of the ground station and general compliance with good engineering standards for harmonisation of working within frequency bands.

UK Broadband considers that Ofcom's suggested maximum distance for co-ordination of about 8 km is prudent, based on our experience of transmission levels from our current working transmitter sites.

Mandatory co-ordination procedures would, we agree, be disproportionate. The ability to apply informal solutions to localised (potential) interference problems has a long history in the telecommunications industry of delivering the greatest benefit to those areas where interference is *not* a problem and delivering the best balance of equipment/system changes by all parties where interference is identified to be a problem.

The mandatory application of very restrictive measures network-wide or nationwide for the benefit of very small areas of geography (probably less than 1%) will needlessly and adversely impact the efficient use of these scarce spectrum resources as well as reducing the commercial viability of new entrants into the market, thus stifling competition.

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?

Yes, UK Broadband agrees. We think this will lead to the most efficient use of the spectrum.

Question 13.2: Do you agree with our preference not to have a transitional region of 5 to 10 MHz between blocks for licences in the 3.4 GHz band?

Yes, UK Broadband strongly agrees. We think this will lead to the most efficient use of the spectrum. We think that co-operation between operators should lead to the optimal use of the available spectrum and, failing that, application of the proposed restrictive mask will achieve the same end as applying a transitional region would have done.

Question 13.4: Do you agree with our preference to include both the permissive and restrictive masks within the TLCs in the 2.3 GHz band?

Ofcom proposes to include both the permissive and restrictive masks, in line with those developed through CEPT, within the technical licence conditions. Provided that Ofcom's masks remain in line with CEPT guidelines, UK Broadband agrees with this approach.

Question 13.3: Do you agree with our preference not to require synchronisation between different networks in the 2.3 GHz frequency band?

Yes, UK Broadband agrees. We think that requiring synchronisation would potentially deny operators the flexibility they need to innovate and adapt to commercial requirements. We think that operators will inevitably choose to synchronise with their neighbours where possible in order to maximise the efficiency of their own spectrum allocations.

Question 13.5: Do you agree with our preference to include both the permissive and restrictive masks within the TLCs in the 3.4 GHz band?

Ofcom proposes to include both the permissive and restrictive masks, in line with those developed through CEPT, within the technical licence conditions. Provided that Ofcom's masks remain in line with CEPT guidelines, UK Broadband very much agrees with this approach.

We think that operators should be given the option of co-ordination their spectrum use with their neighbours, thus enabling the application of the permissive mask which, in turn, would achieve maximum efficiency of use and availability of usable spectrum.

Mandating use of the restrictive mask would inevitably reduce the utility of the spectrum and would therefore not, in our view, result in the most efficient management and use of the spectrum.

Question 13.6: Do you agree with our preference not to require synchronisation between different networks in the 3.4 GHz frequency band?

Yes, UK Broadband strongly agrees. We think that requiring synchronisation would potentially deny operators the flexibility they need to innovate and adapt to commercial requirements. Operators may wish to have the ability to change their UL:DL ratios as their products and services develop, and mandatory synchronisation might restrict their ability to be flexible and adaptive in this way.

We think that operators will inevitably choose to synchronise with their neighbours where possible in order to maximise the efficiency of their own spectrum allocations.

Requiring synchronisation between neighbouring operators could have undesirable consequences. An operator could, in theory, choose to use their spectrum for supplemental download only. A requirement for synchronisation could lead to its neighbouring operator having also to use the spectrum for download only, and this then flowing on down the band, imposing the same requirement on all operators. Such restrictions on the use and application of the spectrum would most certainly have a detrimental impact on competition and choice in service provision.

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

Ofcom proposes that the 2.3 GHz licences will have the same in block power limit as for the 2.6 GHz band, i.e. 61 dBm/ 5 MHz EIRP per antenna. UK Broadband agrees with this approach.

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

Ofcom proposes that the maximum value of the in block emission level for TDD user terminals will be up to a power limit of 25 dBm. UK Broadband agrees with this approach.

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

The work on-going in CEPT PT1 for the 3.4 GHz band, and the draft Commission Decision states that an in block EIRP limit is not mandatory and they support up to 68 dBm/ 5 MHz. . However, OFcom is again concerned about co-existence issues with users in the 2.7 - 3.1 GHz band. Ofcom are therefore proposing a level of 65 dBm/ 5 MHz EIRP per antenna.

UK Broadband agrees with Ofcom's approach.

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

Ofcom proposes that the power level used in the 2.6 GHz band for EIRP of up to 35 dBm/5 MHz would also be suitable for fixed or installed use within the 3.4 GHz band and Ofcom proposes a power limit of 25 dBm for mobile and nomadic terminal equipment.

UK Broadband agrees with this approach.

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?

Yes, UK Broadband strongly agrees.

UK Broadband is a founding member of the 3.5GHz Interest Group within the Global TDD Initiative ("GTI"). We have been actively working with operators, regulators, standards bodies and vendors to secure broad agreement on how best to manage and efficiently utilise the TDD bands, including Band 42 and 43. The consensus of this industry group is that the effective use of spectrum is best managed by the operators themselves, under direction from national regulatory authorities, rather than to have mandatory constrictive national rules on synchronisation or the imposition of guard bands at arbitrary points in the band (for example, every 20 MHz or 10 MHz).

Further, the imposition of guard bands between successful bidders following an auction would also restrict the possibility of spectrum sharing or trading as part of subsequent long term market developments.

We and the GTI strongly support network synchronisation by mutual agreement between adjacent operators rather than mandatory regulation. This would allow operators to provide the best mix of uplink/downlink time segmentation for given areas of their network and to allow the best evolution model over time as the market develops. Where adjacent operators cannot agree suitable terms for synchronisation then they will, of course, use the restrictive band-edge mask and accept any capacity restriction caused by this mask.

Having synchronisation controlled by mutual agreement between operators will also allow the use of advanced TDD schemas such as Supplemental Download by an operator who has adjacent operators with a mix of uplink and downlink time frames. Under these circumstances all adjacent operators would use the restrictive band edge mask. Only where adjacent operators could not agree on a mutual adjacent schema, or where one operator considered that they were being unfairly penalised to deploy the restrictive mask by an operator with undue market strength would request for regulatory intervention be apposite.

Should mandatory guard bands be imposed then this will have the effect of reducing spectrum efficiency to the lowest level as it will negate any advantages which would be available in areas where adjacent operators can reach agreement and use the permissive mask with network synchronisation.

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?

Yes, UK Broadband agrees. Should UK Broadband be required to change allocated frequency within the band then adequate and proportional time and other appropriate provisions should be made to allow any frequency change to take place in a graceful and ordered process.

With respect to co-ordination with aeronautical radars and satellites, we refer to our answers to questions 11.1 and 12.5 above.