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BT Response to the Ofcom Consultation:

Spectrum Commons Classes for Licence-Exemption

A consultation on the management of spectrum used by licence-exempt devices

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1 Introduction

BT is pleased to respond to this consultation on the management of spectrum used by licence-exempt devices and we appreciate Ofcom's effort to tackle this technically complicated subject.

BT agrees with the general approach that Ofcom is taking, notably the principles of spectrum commons classes based on interference characteristics and the proposition of politeness rules. We also note favorably that there is no intention to apply the proposed methodology to the existing licence-exempt bands.

We agree that an early discussion of the future approach to licence-exempt spectrum management is appropriate, not least because there is a need to consider harmonisation of new licence-exempt spectrum bands considering the intrinsic mobility of many licence exempt devices as well as the social and economic benefits of a European (or International) wide market. For this reason BT supports Ofcom's intention to align with the European work on Collective Use of Spectrum.

BT does have some concerns on some aspects of the consultation document. We understand that Ofcom proposes a general approach intended to cover a large range of frequencies and technologies, many of them still unexplored. As a consequence, there is an inherent contradiction between to need to be as generic as possible and, on the other hand, to detail how the methodology applies to a specific frequency bands and/or application. Also, although a very good general framework is being proposed, BT feels that the required details for the development of unambiguous regulations for licence exempt bands is missing. Furthermore, in addition to the proposed classification, efficient sharing in a certain frequency band is likely to require comprehensive compatibility studies for which specific assumptions on the equipment and application characteristics will be needed.

BT has doubts with regards to the definition and practical implementation of some of the concepts and parameters in the consultation document and these are detailed in the answers to the questions raised by Ofcom that we provide in Section 2 below.

2 Answers to the formal questions in the Consultation Document

Q1: Do you agree that the spectrum commons class of a technology should be based on its interference characteristics?

Yes, BT agrees in principle with Ofcom's current proposal, as this appears to be a sensible and rational basis for the co-existence of licence-exempt devices for different applications within a band.

Q2: Do you think that the ratio of channel bandwidth to the width of the band is a good representation of the use of the frequency domain resource and the interference potential of a technology in this domain?

Ofcom's proposal appears to strike a reasonable balance between the need for the interference indicator to be as precise as possible and, at the same time, maintain independence from the victim receiver. However, as for the rest of parameters, careful and unambiguous definition is needed depending on the frequency band and/or the technology under consideration (e.g. in the case of systems that are frequency agile).

Q3: Do you think that the duty cycle is a good representation of the use of the time domain resource and the interference potential of a technology in this domain? Do you agree that the duty cycle should be evaluated at the busy hour?

Yes, in principle BT agrees that the duty cycle for each application is a fair indicator of the use of resources in the time domain.

However, more thought is needed to provide a precise and unambiguous definition, as the derivation of this parameter can vary from application to application as already shown in the examples provided by Ofcom in Annex 6 of the consultation document.

In terms of evaluating the duty cycle at the busy hour, BT agrees with the general idea of considering the worst case when estimating interference, but care should be taken to avoid extremely pessimistic and potentially statistically insignificant cases. In practice, the definition of "busy hour" needs to be specified on a case-by-case basis.

Q4: Do you think that the interference coverage plus the density of transmitters give a good representation of the use of the space resource and the interference potential of a technology in this domain?

BT agrees that this seems a reasonable approach to representing the use of resources in the space domain although, in practice, as also recognised by Ofcom, an accurate estimation of the number of transmitters for some of the technologies involved could prove quite arduous indeed since new bands and future devices are involved. In particular, it is difficult to envisage how the accuracy of the projected market densities could be assessed.

Furthermore, there seems to be an ambiguity in the definition of transmitter density, as it is not clear if it refers to physical devices in the market or to the "active" ones. For instance, many devices can have Bluetooth capabilities, but few may actually be turned on. Also the determination of the area over which the density is computed, although required, may prove highly controversial.

Q5: Do you agree with our method to calculate the interference coverage area of a transmitter?

What is your view on a threshold level of -80 dBm/MHz to determine the interference range?

Do you think the threshold level should be expressed as power density (dBm/MHz) or as power (dBm)?

BT agrees in principle with the computation of interference coverage area, which is simple and straightforward, and with the unit of measure of the power density as dBm/MHz, in order to maintain independence from a specific receiver bandwidth.
The applicable propagation method for the determination of the range will however need to be specified for the different frequency ranges.

With regard to the precise value for the interference threshold level, BT believes that there is a need for reassessment depending on the frequency range and/or application. In general -80dBm/MHz seems a little high compared to the noise floor of most devices. A lower value could possibly be considered. In any case the importance of this threshold value can be offset by the boundary values used for the different classes.

Q6: Do you agree with using a busy yet realistic scenario to derive the transmitter density of a technology?

Yes.

Q7: Do you agree with the Interference Indicator being a product of the frequency domain factor, the time domain factor, the interference coverage area and the transmitter density?

Yes, BT agrees that this is a simplistic, but effective way of combining the factors.
However, some more thought should be given to a potential different weight of the various components. For instance, it could be argued that the frequency domain factor could be more significant than the space one, as full occupancy of the band could preclude transmission from any other devices, at least in some areas. On the other hand, a technology with full area coverage, but which uses only part of the band will potentially allow sharing.

Q8: Do you think that three classes of spectrum commons is the right number? What is your view on the proposed boundary values for the three classes?

Three is a reasonable number of classes to avoid excessive fragmentation or generalisation. However, the difference between the “rights” (access to a band) and “obligations” (application of various politeness rules) applicable to the different classes needs further clarification.

BT feels that the boundary values between the classes are also parameters that may potentially vary for the different frequency bands.

Q9: Do you agree with our definition of fairness and that all systems should be required to behave in a fair manner?

The aim of Ofcom intentions is supported by BT. However, serious concerns exist on how this determination would be articulated in licence-exemption regulations in a clear and unambiguous manner. Also, although it is clear that it is difficult for a polite low-power application to effectively co-exist with an impolite high-power application, the possibility may exist that unregulated low power applications could actually be more problematic than high power applications complying with tight politeness rules. A further challenge will therefore be to consider less intuitive, less obvious, combinations.

Q10: What is your opinion on the effectiveness of blind detection sensing techniques compared to signal specific techniques?

BT does not have a view on this question at this time, as aspects of these techniques are still under development.

Q11: Do you agree with the proposed polite rules?

In principle yes, however more thought should be given to the practical implementation and resulting benefit.

Also, for the politeness rules to be effective, a clear quantification is required in terms of, for instance, the Listen Before Transmit power threshold or the length of quiet periods. An inappropriate value for these parameters could easily result in the politeness rules being totally ineffective.

In addition to the politeness rules being proposed, BT is of the opinion that **a clear safeguard limit should be imposed on the transmitter eirp.** In fact, with the proposed approach, an excessively high transmit power, sufficient to cause blocking of neighboring devices, could be balanced by other factors in the computation of the interference indicator and be therefore otherwise be allowed.

3 Conclusions

In general, BT agrees with the framework proposed to be set up by Ofcom in relation to new licence-exempt bands. BT's views on the consultation questions on the management of spectrum used by licence-exempt devices have been provided. However, BT is concerned that, for this approach to be effective, further detail is necessary and a great deal of care will be needed in formulating unambiguous regulations and clear guidance. Therefore BT is of the opinion that further consideration is required on a number of issues, as indicated above. We are ready to discuss any points in greater detail with Ofcom if required.