

BLU WIRELESS TECHNOLOGY SUBMISSION TO OFCOM'S CONSULTATION, 5G SPECTRUM ACCESS AT 26 GHZ AND UPDATE ON BANDS ABOVE 30 GHZ

September 2017

Blu Wireless Technology Ltd is pleased to have the opportunity to respond to Ofcom's consultation, *5G spectrum access at 26 GHz and update on bands above 30 GHz*. As a technology provider for millimetre wave applications our primary interest is that suitable technology can be developed which can be scaled across multiple regions, frequency bands and applications in order that economies of scale can drive the widest possible adoption of the use of millimetre wave bands for new 5G wireless applications.

Our answers to the questions raised in the OFCOM consultation are as follows:

Question 3.1: Are there any other aspects related to the existing use of 26 GHz not covered in this CFI that you believe need to be considered?

We believe that OFCOM need to, wherever possible and noting ongoing discussions w.r.t. WRC2019, align with emerging technical limits for channelization & EIRP limits etc as already defined by the FCC in their July 2016 R&O. This will minimise time to market equipment for availability in the UK market and also allow economies of scale from equipment developed for the wider US and Asian markets to be achieved.

Question 3.2: What options for the existing services in the 26 GHz band do you believe need to be considered to allow for the introduction of new 5G services? Please give as detailed a response as possible along with all relevant information and explain how you would see any potential option you provide working in practice.

Blu Wireless Technology supports the recent submission to the CEPT SE19 group from the ETSI mWT ISG in the Liaison statement dated 29th August 2017 on managing the current use of the 26 GHz band for Fixed Services backhaul equipment in Europe stated that:

ISG mWT has decided in the last Plenary Meeting to conduct an analysis of coexistence between IMT and Fixed services in the 26 GHz band, with particular focus on the interference caused to FS.

ISG mWT decided to contribute to the analysis carried out by PT1 leveraging on the competence and experience of most of its members as regards the Fixed Services.

Moreover, an the initial analysis by ETSI mWT ISG members showed that approx. 3,000 licenses for FS operation in the UK are already active and that these users will need to be managed out of this band to prepare the way for full 5G operation in the UK. The initial analysis also suggests that protection distances of between 8 and 30 km (depending on antenna alignment) could be required to avoid 5G services from interfering with FS services. This work is ongoing within ETSI mWT ISG.

Question 3.3: Should a moratorium be placed on issuing new licences in the 26 GHz band for existing services? E.g. to ensure that the 26 GHz band is not unnecessarily encumbered prior to the development of a new authorisation / licensing approach for 5G services?

We believe that it follows from the answer to question 3.2 that new licenses for existing services in the 26 GHz should not be issued in the interests of preparing this band for future 5G deployments.

Question 4.1: What service would be delivered and to which consumer and/or organisations?

Gigabit rate services over ranges of ~500m could be delivered for 5G applications using 26 GHz – subject to the suitable definition of channel width and transmit EIRP. This would benefit deployment of higher bandwidth in campus deployments, such as hospitals, universities, and large industrial sites as well as vertical applications such as transport – automotive V2X and rail. We also believe that consideration needs to be given by OFCOM for unlicensed use of the 66-71 GHz band with a EIRP limited suitable for extended range vertical applications such as transportation.

Question 4.2: Where in the UK would the 26 GHz spectrum be used to deliver services? For example, will deployments be focussed on:

- a) Areas of existing high mobile broadband demand?**
- b) Rural areas?**
- c) Rail and road corridors?**
- d) Specific types of enterprise or industrial sites?**
- e) Indoors or outdoors?**
- f) Specific nations or regions of the UK?**

We believe that the nature of operation of 26 GHz would suit outdoor applications in urban and suburban deployment scenarios with typical link range in the region of ~500m for the delivery of gigabit rate data. This would also include rail and road corridors – noting also that it could be very beneficial to use the higher 66-71 GHz unlicensed band for rail/road corridor applications to minimise interference with licensed operation at 26 GHz since applications in rail/road corridors would cause frequency planning and co-ordination problems where such corridors cut through dense areas of general deployment of 26 GHz licensed services – for example for Fixed Wireless Access in sub-urban areas adjacent to major rail or road corridors.

Question 4.3: Where 5G cells are deployed, are they expected to be individual cells or as clusters of cells required to give wider areas of contiguous coverage? What would be the area of a typical contiguous coverage cell cluster?

Both standalone cells and interconnected cells using, for example, Mesh or Star networking and active beamforming methods will be possible. A typical cell radius could be between 500m and 1000m depending on EIRP and link budget. Mesh or star networking methods combined with fibre Points of Presence (PoPs) could then extend that to cover sub-urban areas such as being envisaged for initial deployments of 28 GHz equipment for Fixed Wireless Access services in the US and Asia. Such an approach would also lend itself to the use of Neutral Host Model providing the infrastructure for such PoP and associated core network gateways.

Question 4.4: What capacity and bandwidth (i.e. Channel Bandwidth in MHz) would be required at each cell to meet initial capacity requirements? How will this change over time?

We recommend that OFCOM aligns with rules announced by FCC in their July 2016 R&O of up to 450 MHz channel width and EIRP limits of up to 75 dBm/100 MHz for fixed equipment. This will allow maximum re-use of equipment already being developed for US and Asian markets in the UK.

Question 4.5: What quality of service is required? How sensitive is the service being offered to variations in radio interference from other operator's 5G cells and other spectrum users?

We believe that this is yet to be determined and further work on interference modelling with realistic channel models and GIS data is required to answer this question.

Question 4.6: Will end users be fixed or mobile?

Initial deployments are likely to be fixed users with mobile users being in road/rail corridors. As per the answer to Q4.2 we believe that consideration for use of the 66-71 GHz band for rail/road use should be carefully considered.

Question 4.7: What are the characteristics of 5G at 26 GHz which make this band particularly suited to the service you plan to deploy? What other spectrum bands could be used as an alternative, or in preference to, the 26 GHz band? To what extent could carrier aggregation and other techniques reduce your reliance on 26 GHz?

We believe that the 66-71 GHz band, under unlicensed or lightly licensed rules, would provide complementary benefits to the 26 GHz band for vertical applications such as road/rail corridor access. The ability to support very wide channel widths of ~2 GHz allows low order modulation waveforms to be used to deliver gigabit rate data with improved quality of service for mobility applications. We also believe that carrier aggregation methods at mmWave bands should generally be avoided due to (for example) increase RF losses for band switches and the difficulty in using active beamforming due to the loss of channel reciprocity for up/down link creation.

Question 5.2: What methodologies could be used to pre-define 'high demand areas' for area defined licences?

Site survey for fixed users based on population and internet demand would aid initial planning. Active assistance based on GPS derived location information for road/rail corridors would also be beneficial.

Question 5.3: What mechanism could be used to coordinate cell deployments by different operators in shared spectrum?

The quasi-line of sight nature of millimetre wave propagation combined with the need for directional antennas to develop the necessary link budget for realistic operation should lend itself to un-coordinated operation than would be the case at traditional access frequencies at ~ 2 GHz. Further study and modelling on precise interference scenarios based on GIS and channel modelling is needed before a final determination can be made.

Question 5.5: Do you agree that the 26 GHz band should be released progressively? What risks do you envisage with such an approach and how can these be best mitigated?

Yes – we believe that early release of the 1 GHz bandwidth from 26.5 to 27.5 GHz should be made as soon as practical as we understand that is only lightly used by the MoD. This would allow early deployments of pioneer applications and assist with further spectrum release below 26.5 GHz where existing FS users will need to progressively re-farmed.