Consultation response form

Your response

Note: question numbers are aligned to relevant sections in the call for inputs document. As such, there is no question 1.

Question 2.1: What are your planned timelines for commercial availability of network equipment and devices for the 26 GHz band? When will equipment for testing and trials be available? Please specify the specific mmWave tuning ranges supported and their timing.	Confidential? – No We are aware of developments regarding 26GHz end user devices, but none that we know of are currently underway in the UK. This is concerning, and such development work in the UK should be encouraged. However, the UK has few independent test networks where live deployments could be made. For fixed wireless access use, we believe equipment will be available for deployments in Q2 2018.
Question 2.2: Given the 3GPP studies into NR-based operations in licence-exempt spectrum, when (if ever) do you expect to support licence exempt operation and/or coordinated sharing in the 26 GHz band in your products?	Confidential? – No Alongside technical considerations, geospatial factors will impact the speed of change in this area. The exponential increase in the number of sites required means that spectrum users at 26 GHz will be particularly keen to reduce deployment costs. 3D geospatial mapping-based tools and OS addressing products deliver just this benefit, and OS is able to assist in this regard anywhere in the UK.
Question 2.3: When do you expect to support standalone New Radio in the 26 GHz band in your products?	Confidential? – No Our understanding is that 5G New Radio (5GNR) equipment will be available from 2020. We are confident that OS's roadmap for geospatial content to support 5GNR will be fully available to enable deployment at the lowest costs and fastest timeframes.
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	Confidential? – No The management of coexistence across all

considered?	bands is not adequately covered in the CFI. The work that we have undertaken demonstrates that coexistence can be managed using detailed geospatial content in all geographies.
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.	Confidential? – No We support Ofcom's plans to undertake sharing studies between current and future users of the bands.
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?	Confidential? – No Our understanding of the Communications Act 2003 is that there is a statutory duty on Ofcom to ensure optimal use of UK radio spectrum. We would support the continued issuing of new licences where that there are no coexistence issues.
Question 4.1: What service would be delivered and to which consumer and/or organisations?	Confidential? – No Although we do not produce equipment or services, we interface with many parties that do, because insight gained from use of current, accurate geospatial content for planning makes deployments cheaper. From our discussions, we see a trend in the 26GHz band from point-to-point and fixed radio access to greater mobility delivered to handsets. We have identified 3 likely areas where it is reasonably foreseeable that services will be delivered in this band. They are: 1 – Public safety 2 – Public health and telemedicine 3 – Rail transport
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?**	Confidential? – No We expect 26 GHz to be deployed in dense urban areas with high traffic and footfall, for example: • central, high-density urban streets and pedestrian areas • transport hubs • retail complexes (shopping centres) • large events and stadia

f) Specific nations or regions of the UK?	• points of interest (tourist areas) • high-demand residential areas • business districts Additionally, rail and road corridors could benefit from 26 GHz coverage since they are densely populated at certain times. Given the projected increase in the use of these corridors, planning now for spectrum capable of servicing this need is a logical step. We expect that 26 GHz will primarily be used for outdoor communications but could additionally offer seamless communications within buildings through direct conversion to other frequencies including WiFi at 2.5 GHz and 5 GHz, and potentially in its own right in due course.
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?	Confidential? – No Both. The precise range of a 26 GHz cell will be considerably smaller than for current 4G. Based on our research, which used detailed 3D clutter data in Bournemouth in conjunction with weather scenarios from the Met Office and spectrum algorithms from University of Surrey's 5GIC, we believe that a cell could typically range from 75m to 200m in diameter. Given the small size of these cells, it will be feasible to deploy them individually or in clusters without causing harmful interference. People will expect contiguous high bandwidth coverage in urban areas, where it will be essential to avoid bottlenecks – so it makes sense to deploy cell clusters in these geographies.
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?	Confidential? – No We expect the capacity and bandwidth requirements to change over time, and we further expect that geospatial considerations will become increasingly relevant.
Question 4.5: What quality of service is	Confidential? – No

required? How sensitive is the service being offered to variations in radio interference from other operator's 5G cells and other spectrum users?	High availability and low latency are critical considerations relating to the key areas of public safety, healthcare, and transport. We believe it is appropriate to set a high bar, since such services will typically require a high quality of service. We see merit in a study to address more fully the second part of this question. This is a frequency band in transition, so such a study would be a prudent step.
Question 4.6: Will end users be fixed or mobile?	Confidential? – No In the immediate future we expect usage to be predominately fixed, but that mobile usage will grow considerably in the longer term.
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?	Confidential? – No No response
Question 5.1: Should Ofcom consider licensing options other than the 3 examples set out above (licence exempt, shared coordinated and area defined) for the 26 GHz band? If so, what other options do you consider should be included?	Confidential? – No The challenge is how to deliver UK 5G leadership in line with the government's stated strategy. All steps that liberalise access to the 26 GHz band and subsequently encourage its widest possible use will help relieve pressure on other bands, and helps the UK secure this key policy goal. We are aware of innovative approaches to access to 5G spectrum already being deployed by regulators in other jurisdictions that allow deployments based on a minimal licence application form. We welcome all the options put forward, and see merit in Ofcom considering a more flexible approach where this would encourage additional investment and R&D in the UK. Such an approach is already in line with Ofcom's

	current duties under the Communications Act, and since regulation always lags technology it makes sense to adopt the most flexible methods and procedures possible.
Question 5.2: What methodologies could be used to pre-define 'high demand areas' for area defined licences?	Confidential? – No Planning for demand is important and has a profound effect on costs of both capital equipment and deployment. Therefore sources of data indicating 'footfall' and potential demand are vital. Such sources include: • Density of built landscape • Building usage • Consumer sales at individual premises or large shopping malls • Socio-economic data • Transaction records – sales, tickets • Mobile tracking data • Events – known capacity of stadia, types of events and popularity • Traffic counts
Question 5.3: What mechanism could be used to coordinate cell deployments by different operators in shared spectrum?	Confidential? – No We advocate the concept of a central register of infrastructure assets to coordinate cell planning to simplify and accelerate deployment. As an independent and government-owned body, OS would be happy to contribute to the specification and development of a secure platform and data quality standards to enable effective coordination.
Question 5.4: What methodologies could be used for determining the proportion of spectrum to allocate using area defined licences and coordinated deployment?	Confidential? – No We suggest that a hybrid authorisation approach which allows the development of new services alongside incumbent users, and seeks to respect the needs of both communities.
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?	Confidential? – No We see merit in the 26 GHz band being made available as soon as is practicably possible to try

	to help secure UK leadership in 5G.