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? – N *except customer names* CBNL has been producing 26GHz FWA products since 2009. Since 2011, we have shipped over 22,000 26GHz radios to at least 45 telecom operators in Europe, Latin America, Middle East and Africa. Operator customers (specifically at 26GHz) include, among others, [✂]. The product line is under continuous development to improve performance and functionality. Products follow the 26GHz band plan harmonised by ITU-R F.748-4 Annex 1, covering the entire band.
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? – N Will not support within the next 3 years.
Question 2.3: When do you expect to support standalone New Radio in the 26 GHz band in your products?	Confidential? – Y [✂]
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?	Confidential? – N There are existing FS systems in use in the 26GHz band, both P-P and P-MP, all of which are using Frequency Division Duplex (FDD). With multiple FDD channels in the 26GHz band, it is possible to plan and deploy P-P and P-MP networks over a wide area while managing interference to acceptable levels. 5G standards may include Time Division Duplex (TDD). Introduction of 5G access technologies using TDD into the 26GHz band needs to be done in a controlled manner that enables co-existence with present and future FDD users in the band. For example, spatial separation regulation may be required between P-P/P-MP systems (largely situated on roof tops and higher structures) and 5G access systems (which could be limited to indoor and low level

	street furniture deployments) to create sufficient interference protection to facilitate co-existence to make most use of the valuable spectrum. While FDD allows for simple, future-proof interference coordination, including between systems operating to differing technical standards, this is not the case for TDD.
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? – N Existing fixed service use should continue to be permitted (including new P-P and P-MP links).
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? – N No.
Question 4.1: What service would be delivered and to which consumer and/or organisations?	Confidential? – N Mobile backhaul for MNOs. Enterprise and residential access for ISPs and relevant business units of operators. End-users likely to be SMEs and premium residential users. Smart city and industrial applications.
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?**	Confidential? – N For fixed users: Predominantly outdoors in the following scenarios: Dense urban, urban and suburban built-up areas (outdoors). Rural settlements (depending on link range). Railway station and marshalling areas. Industrial parks and facilities. Additionally indoors for special scenarios. NB CBNL have deployed systems in all these scenarios.

	For mobile use, CBNL do not expect any 26GHz coverage outside the highest density urban areas.
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? – N For CBNL products, the coverage area is typically up to 7—10 square kilometres per access point. To support ultra high capacity densities, this may be scaled downwards arbitrarily. A contiguous coverage cluster could easily be equal in area to any given metropolitan area, with capacity density tuned according to demand density.
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? – N At least 112MHz paired, growing to 224MHz paired by 2022.
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?	Confidential? – N QoS should be comparable with fibre. There should be no sensitivity to extrinsic interference within an operator's licensed channels. Multiple large channels must be available to an individual operator (in a specific location) in order to allow N > 1 frequency reuse. This allows the spectral efficiency of a wide area system to remain maximal under load, which CBNL regard as essential for SLA-backed FWA type application.
Question 4.6: Will end users be fixed or mobile?	Confidential? – N Fixed.
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? – N Availability of large channel sizes is the primary attraction. Many other possibilities up to 60GHz Orchestration with unlicensed bands at 5GHz and below will allow LoS and building

	penetration loss mitigation.
Question 5.1: Should Ofcom consider licencing 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? – N Yes. Some form of preferential access to a subset of the band for municipal authorities should be considered. CBNL believe this could help to stimulate the development of smart city applications, as seen elsewhere in Europe.
Question 5.2: What methodologies could be used to pre-define 'high demand areas' for area defined licences?	Confidential? – N Population density and demographics Existing 28GHz license areas are too large Something closer to the size of county or unitary authority areas would be better, with additional subdivision in London
Question 5.3: What mechanism could be used to coordinate cell deployments by different operators in shared spectrum?	Confidential? – N Anything except rudimentary methods is likely to prove too complex to operate across organisational boundaries. CBNL experience is that operators are very resistant to shared spectrum.
Question 5.4: What methodologies could be used for determining the proportion of spectrum to allocate using area defined licences and coordinated deployment?	Confidential? – N The majority of spectrum should be area-defined exclusive use licenses in our view, with a small minority either license exempt or shared coordinated. We would expect sharing not to occur in practice.
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? – N No, it should be all be released at once, to avoid an artificial supply constraint. Progressive release would seem (because of first mover advantage) to arbitrarily inflate the value of early-release spectrum? It may be desirable to reserve some spectrum for organisations not having spectrum holdings in traditional mobile bands, in order to stimulate new market entrants. Alternative mechanisms such as a ceiling on overall spectrum holdings may be workable.

	We reiterate the point at 5.1 about preferential access for municipal authorities.