Call for Inputs on 5G spectrum access at 26 GHz

Executive Summary

Bournemouth was rated by WHICH? magazine during 2017 as having the worst 4G service of any city in the Country. We have a genuine need for improved connectivity and we are playing an active role in 5G. We welcome the chance for engagement with Ofcom to help address this. Ofcom will already know we were the chosen test bed site for the advanced 5G mapping work done by Ordnance Survey, which specifically included a granular analysis of how 26GHz could be most cost efficiently deployed, and a detailed analysis of both all fixed and potential mobile assets. We are now truly ready for "real" 5G, now.

We are in the process of completing our own fibre network, and will be looking to work with partners to explore the potential of 5G mmWave in a "real" environment. Time matters if the UK is to be a leader in 5G in line with the government's ambition.

Bournemouth Borough Council is supportive of attempts to speed up access to the 26GHz band in the UK, and provides in this submission information obtained from discussions with manufacturers, operators, trade bodies and wider government. We would make the following key points:

➢ It appears from our conversations that the UK may not be the destination of choice for major manufacturers of early 26GHz end user devices or Fixed Wireless Access Equipment. We are therefore looking at other opportunities to work with smaller manufacturers.

➢ Bournemouth is completing its own fibre ring and will soon be ready for "real" 5G deployment helping to address its existing poor 4G coverage.

➢ The potential of 5G at 26GHz and the significant implications for the wider UK economy make spectrum auctions a less appropriate tool for its future release.

➢ A more flexible and faster licensing regime is highly desirable. There seems to be no reason why the upper part of the band could not be released rapidly. The optimal use of the radio spectrum is of benefit to UKPlc. On license flexibility, we would welcome a longer license term to enable the attraction of industry engagement and interest.

➢ We see little merit in any National licence auction for the entire 26GHz band. We have concerns that this would price out from the market those organisations such as local authorities who simply want to enable better digital connectivity for their local businesses and residents. Local authorities have a very good understanding of the drivers for their local economy and are therefore well placed to act as "neutral hosts" for digital networks, be that independently or working in partnership with appropriate operators.

Bournemouth Borough Council:

Situated on the south coast of the UK and within two hours of London, Bournemouth is home to 180,000 residents. Including the wider conurbation of Poole and Christchurch, it has a combined population of half a million.

It has the third largest financial sector in the UK after London and Edinburgh and has the second largest international education sector outside of London. It was the fastest growing UK digital economy in 2015 and is currently the No. 1 in the UK for high growth technology companies (Tech Nation Reports 2015 and 2017).

Bournemouth is committed to developing a leading place for people to live, work and visit and sees connectivity as fundamental to attracting and retaining talent and businesses. We support the government's Industrial Strategy and Digital Strategy and have used these strategies as frameworks to develop our own local plans for economic growth and productivity that will be of benefit to the UK.

Responses to the Call for Input questions

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.

We are not a vendor of equipment however we are aware that manufacturers from overseas are working on 'tuning down' their 28GHz equipment made for the Asian and US markets to meet the European 26GHz frequency.

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?

We are not an equipment vendor.

Question 2.3: When do you expect to support standalone New Radio in the 26 GHz band in your products?

We are not an equipment vendor. However, our discussions lead us to believe that late 2020 is the most likely date.

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 see merit in a trial to see how deployments like that within Bournemouth can be achieved without impacting upon existing users of the band such as the energy sector. Bournemouth would be pleased to work with Ofcom to help assess any impacts upon existing users of this frequency on its test-bed site.

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.

We see merit in sharing studies being launched urgently, perhaps as part of the upcoming DCMS 5G funding plans later this year, and believe Ofcom is already intending that some be undertaken anyway.

We note that there are around 3000 fixed link licensees in the band that will need to be protected, and probably nearly double the number of actual links. Sharing between these users and new 5G services of whatever kind, must be a priority task. How will cellular style high density deployments work alongside these links?

In order to minimise the potential for any disruption it also makes obvious sense for spectrum to be released first in the upper part of the band from 26.5-27.5GHz where there are fewer links deployed and where it is easier for manufacturers to tune the 28GHz equipment they are already making down to work in this range and facilitate the standardisation process which ultimately leads to lower equipment prices thanks to economies of scale. To fail to do this will delay the UK's ambitions to be a World leader in mmWave 5G.

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?

No. We welcome the flexible approach the Nordic region is taking to issuing licenses in this band.

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

We would initially look to provide a 26GHz fixed network to major businesses in our leading sectors and new digital start-up businesses within the conurbation. We would then look to extend this offer to other local businesses.

We are particularly interested at being at the forefront of creating a 5G 26GHz mobile network, which is dependent upon the development of suitable mobile devices. As soon as these become available our aim would be to supply these to a range of, local and national agile digital businesses so that they can immediately explore potential uses of mobile 5G and begin to build mobile 5G applications.

We are already looking at specific use cases in partnership with businesses that would help to address issues faced by a wide range of end users including leisure visitors, business visitors, residents, the elderly, the disabled and the partially sighted.

We have identified four key areas in 5G development and we set out below in general terms the key fields:

Health and Wellbeing

The NHS Foundation Trust is currently managing a major merger between the hospitals across the conurbation. This provides an opportunity to review and develop connectivity services. In early conversations with the Dorset Clinical Commissioning Group we have identified opportunity to develop use cases around, but not restricted to:

- HQ video capability for diagnosis in homes in rural and urban locations
- ability of wearables to switch from home based broadband to high performance wireless to allow uninterrupted data flows
- robust services in high dependency areas such as the Police HQ in Winfrith (poor coverage). Winfrith is our gold command centre for emergencies.

- ability for remote workforce to use Skype over mobile network reliably
- streaming of HQ images to remote mobile workers (paramedics, first responders)

We are also aware of innovative software being developed in locations such as Sunderland to join up NHS and local authority care plans and to use big data analytics to spot potential problems, in particular for the elderly. This could lead to both better services and potentially cost savings too – but only with the right infrastructure and applications deployed. Bournemouth is interested in how we can join up with cities across the UK in health to deliver benefits at scale to the UK

Citizen Safety.

Partnership work with CCTV managers and Dorset Police have identified key areas where new mobile technologies may benefit citizen safety. The annual Bournemouth Air Festival attracts 1.2 million visitors per year. AFC Bournemouth is a Premier League football club looking to double its stadium capacity in the next 3 years. We owe our visitors a special duty of care and want them to be safe in our city. Specific use cases could include, but are not limited to:

- How can 5G enable high quality real time video streaming with no delay?
- What are the outcomes of receiving better quality and more accurate footage on convictions and public 'perception' of safety?
- How can existing infrastructure and advances in video analytics capture safety and gait analysis/ health problems?
- How can 5G enable new uses for facial recognition and what are the associated impacts?
- What are the well-being benefits of people working in the area as a result?
- What are the commercial benefits in the area of increased footfall as a result of improved confidence in the 'problem' areas?

Bournemouth has recently set up the Dorset Cyber Alliance with the aim of building business and community resilience across the Dorset LEP region. Bournemouth is the UK base of a major European cybersecurity firm. The University is also connected to the fibre ring, and has a significant cybersecurity programme already. Additionally, Bournemouth is the home of a major data centre. Unless we can improve the connectivity and resilience of our businesses – which is priority of National importance, we will not be able to grow the region's cyber competence.

Active Travel

The aim across the conurbation is to reduce dependence upon car use and encourage people to travel more actively and sustainably, typically through walking, cycling bus and train use. This has the combined benefit of improving individuals' health, improving air quality, improving road safety, reducing carbon emissions, reducing congestion and enhancing the 'sense of place'.

A major barrier to people switching to more active modes of transport is the lack of good quality information. The aim of this project is therefore to use the potential of 5G to provide high quality, 'real-time' information to travellers to enable them to assess all their options whilst travelling. The learning from this use case could then be rolled out to other towns and cities.

This use case will aim to:

- Use high speed 5G data to provide 'real-time' and bus and train information
- Use high speed 5G and augmented reality to provide 'real-time' navigational aids and maps for cycling and walking
- Use of 5G to provide immediate details of any problems on the transport network

- Using data to help individuals assess the benefits that they have created – e.g. no. of miles cycled, metres walked, calories burned, CO2 saved etc.

Education and Learning

Bournemouth is home to Bournemouth University, Arts University, Bournemouth & Poole College and 26 international language schools. This project involves using 5G technology and augmented reality to make historical, cultural, geographical and physical information 'come alive' to significantly enhance the learning experience. A particular focus will be on improving engagement with younger people in learning which can then be used across the UK. This use case will aim to:

- Use augmented reality to encourage cross disciplinary learning. For example AR could display information over a building and teach construction, history and design;
- Use augmented reality as a gamification tool via treasure hunts;
- Understand how Ordnance Survey's 3D model can enable learning and engagement;
- Understand what positive impacts 5G could have on learning and education.

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?

Yes – our major business areas; transport hubs; major arenas, the beach and foreshore.

b) Rural areas?

Not applicable to Bournemouth

c) Rail and road corridors?

Yes – we envisage 5G being a critical tool in helping to manage our transport networks

d) Specific types of enterprise or industrial sites?

Yes, supporting our digital, financial, manufacturing, entertainment and health sectors.

e) Indoors or outdoors?

Both, but primarily outdoors

f) Specific nations or regions of the UK?

No - deployment should be focused on those areas which demonstrate the ambition to make the most of the technology.

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. Cells could be deployed both individually and/or in clusters without causing harmful interference because they will be so small. This is based on the actual 26GHz testing work done in Bournemouth. The coverage area would be approximately over a 200m radius from each cell cluster (assuming a 360 degree configuration)

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?

Channel bandwidths will have to be far greater than today, and this could increase the importance of the role of neutral hosts.

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?

Initially a reasonable level of service during the trial period, however as intelligence is gathered about operation in a real world environment we would ultimately be aiming to provide a high quality and reliable service connection. We do not anticipate any significant interference due to the under-utilisiation of the 26GHz frequency, plus the ability to fine tune the small cell to help counteract any interference.

Question 4.6: Will end users be fixed or mobile?

Initially fixed but evolving into more mobile use.

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?

High capacity and very low latency, particularly in the downlink, will make the 26GHz frequency very attractive to businesses, residents and the wider public.

The characteristics of this band that make it particularly well suited to the kinds of service we wish to deploy include small cells, high data rates, and ability to use this band in particular in Bournemouth due to having the UK's most sophisticated 26GHz coverage prediction tool. We can configure a whole network or just an individual cell from the desktop all in one go and all in real time. This can result in huge cost savings and facilitate network densification.

Question 5.1: Should Ofcom consider licencing options other than the 3 examples set out above (licence exempt, shared co-ordinated and area defined) for the 26 GHz band? If so, what other options do you consider should be included?

Bournemouth has already proposed an immediate change so that a licence of longer duration to the existing 6 month duration T&D, non-operational one could be awarded. Longer duration licences are vital if locations in the UK are to be able to attract interest in 5G, particularly from research and development vendors of 5G equipment who need much longer test times in order to justify any investment.

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

All the kinds of techniques needed to do this formed part of the work Ordnance Survey did in Bournemouth. Simply by having a "big data" approach to the problem and joining up all the sources of data that already exist, it is possible to take giant strides forward at low cost.

We already can, and would be happy to share with Ofcom the kinds of considerations should Ofcom be interested in meeting us. These would be nationally applicable.

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

It makes obvious sense to us to have a central repository for all spectrum deployments – as well as for all buried assets too. We would have thought that since this has significant value to the whole economy, Ordnance Survey would be ideally placed to manage such a database, since they can already map so much of what is needed. By virtue too of its work on "Resilience Direct" for Cabinet Office, it would seem to us that Ordnance Survey really do have the necessary understanding of even how to "tier" levels of access to such a resource – they are already trusted in this regard.

Question 5.4: What methodologies could be used for determining the proportion of spectrum to allocate using area defined licences and co-ordinated deployment?

We support a hybrid authorisation approach, allocating defined spectrum to existing users; further defined spectrum to neutral hosts and finally defined spectrum for commercial Mobile Network Operators.

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?

We would like to see a progressive release begin as a matter of urgency, beginning with the upper part of the 26 GHz band.