

## Your response

Question	Your response
Question Do you have any comments on our analysis of the current use of spectrum bands in the frequency range 100-200 GHz, or the potential future use of these frequencies? Do you have any comments on current or future use of the specific bands 116-122 GHz, 174.8-182 GHz and 185-190 GHz?	Your response I am pleased to see that Ofcom is looking at making use of frequencies >100 GHz. I think it is very important for the UK to look at frequencies >100 GHz. After having been involved in research & development of RF/wireless technologies (antennas, propagation, RF/microwave/mm-wave/THz components and subsystems) since 1990s, I have seen many ups and downs in technologies, but there is one trend which is very clear, i.e., the frequency of wireless system is always going higher and higher. Sub-THz (100-300 GHz) and THz (300 GHz to 3000 GHz) are the next waves. Many countries such as US, Japan, China, Germany, etc, have had lots of research and development in technologies at sub-THz and THz. For example, researchers at Japan (Tokyo Institute of Technology, Panasonic Ltd, etc) reported high-speed wireless systems at frequencies >100 GHz several years ago. It is very important for the UK to consider R&D in this field so as to develop the capability of the UK and also place the UK at the frontier of this technology which will be the next wave in future wireless systems (imaging for security & medicine & health, wireless communications, etc). Potential applications include compact radars for high-resolution imaging for airport security checks, medical imaging, and high- speed wireless communications (for short range indoor applications or in the space). Another example is that the 6 <sup>th</sup> generation (6G) mobile communication system is likely to use frequency bands within 100-200 GHz. (currently I am involved in writing the revised version of 6G white paper which will be published soon. I am responsible for writing the chapters on antennas and RF system architectures in 6G). Wireless systems at >100 GHz have advantages of compact size (small antennas and circuits)
	and wide bandwidth. The systems at >100 GHz also have some problems, for example: 1). high loss due to free-space radio propagation and the losses due to atmosphere (water
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	absorption, O2, etc); 2). Low output power level. These problems can be solved by developing innovative solutions to antennas and RF systems & materials & manufacturing technologies. Such a technical challenge can only be overcome by having a multi-disciplinary research consortium from several universities including experts in areas of antennas, RF circuits, devices, materials, manufacturing technologies, measurement technologies, wireless systems, etc. The technological progress in these fields is rapid and I believe these problems will be overcome in the near future. The University of Kent completed a multi-disciplinary research project (WISDOM) on THz active phased arrays recently, and we are well placed to lead and organize such a research consortium if there is an opportunity for us to carry out this research project
Are there any further bands above 100 GHz which you think Ofcom should consider making available on a technology and service neutral basis? Which benefits might be realised from enabling access to further bands?	I would suggest Ofcom consider making frequencies 100-1,000 GHz available, if possible. This is because the next step after 100-200 GHz will be to move to higher frequencies again. Would be good to look at R&D of technologies in frequencies during 100- 1000 GHz.
Do you have any comments on the approach we have used to assess the potential effect of our proposals on EESS?	No
Do you have any comments on our proposals to authorise devices to operate on a licence-exempt basis in the 116-122 GHz, 174.8-182 GHz and 185-190 GHz bands?	No
Do you have any comments on our proposal to create a 'Spectrum Access: EHF' licence to authorise increased power use in the 116-122 GHz, 174.8-182 GHz and 185-190 GHz bands?	No