

## Your response

Question	Your response
<p><b>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?</b></p>	<p>Confidential? – N</p> <p>The frequency band 174.2-182 and 185-190 cover critically important bands for weather forecasting and climate monitoring. The bands chosen have been used as EESS bands in mature operational applications for over two decades. Currently they are used by operational satellites from Europe (MHS on the Metop series, which will continue with MWS, ICI and MWI instruments on the second generational Metop satellites), USA (ATMS on the JPSS satellites; SSMI/S on the DMSP satellites), China (MWHS on the FY3 satellites), Russia (MTVZA on the Meteor-M satellites) and India (SAPHIR on the Meghatropiques satellite). At ECMWF the impact of the observations from observations between 174 and 191 GHz is joint highest impact of any type of meteorological observation.</p> <p>The 116-122 GHz band is currently used operationally from the Chinese FY3 satellites and will become available from 2022 on the European Metop second generation satellites, and on similar time-scales from the TROPICS constellation of Cube-sats from the US. The band is less valuable than the channels centred on 183.31 GHz, but is still important enough to be used operationally, and its loss would be a backward step. The band is being considered for other sensors on small satellites, as it lends itself better to compact instrument design than lower frequencies.</p> <p>The long term continued use of the channels centred on 183 GHz (from 174-191 GHz) is assured on the plans of all the big space agencies, including EUMETSAT, ESA, NOAA, NASA and CMA. Furthermore there are plans (e.g. TROPICS in US) to use these bands (all three) on constellations of small satellites to</p>

	<p>provide high temporal resolution equivalents of the current missions. Therefore their importance is set to grow even more in the coming years.</p> <p>High quality observations free from interference from these bands are essential to critically important operational services that support UK sectors including public weather advice, advance warnings of threat to life and property, emergency management, air quality, transport, health, energy, agriculture, tourism, business and commerce and defence.</p>
<p><b>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?</b></p>	<p>Confidential? – N</p> <p>Yes, between 100 and 200 GHz most of the spectrum apart from the bands selected and the EESS bands at 150 and 166 GHz, which are very important for lower level moisture. It was therefore surprising given the motivation was reported to be to stimulate more use of underused parts of the spectrum to select bands that have mature operational applications of critical importance to national UK infrastructure. It would appear much more appropriate to select bands that are not currently utilised, or not utilised in such a critically important area.</p>
<p><b>Do you have any comments on the approach we have used to assess the potential effect of our proposals on EESS?</b></p>	<p>Confidential? – N</p> <p>The analysis fails to account for the much lower attenuation of the atmosphere at frequencies between 174 and 191 GHz when it is very dry. Typically in the winter the water vapour content of the atmosphere becomes low, due to cold temperatures, and satellite observations at these frequencies become increasingly sensitive to emissions from the surface. The analysis performed assumed a global average atmospheric profile, which has much higher attenuation. It is essential the calculations are done with a very cold, dry atmosphere, as this is the worse case scenario. Otherwise the analysis is too optimistic about the potential impact of emissions on the existing EESS sensors.</p> <p>It is also clear that the calculations have not taken account of scattering in the atmosphere. In operational systems these observations are</p>

	<p>used in a so called “all-sky” framework, where scattering by cloud hydrometeors and raindrops is modelled and the data used in all weather conditions. In the presence of rain or cloud there is significant scattering of emissions in the direction of the satellite receiver. This effect needs to be quantified and taken account of in assessing risk to existing users of spectrum at these frequencies.</p> <p>As the 116-122 GHz channels are centred on an oxygen absorption spectral absorption line, the attenuation is much less variable than those centred on 183.31 GHz which is a water vapour absorption line. Therefore the global mean profile used is adequate here. The cloud scattering is also less strong than at 183 GHz. Therefore the calculations at 116-122 GHz are probably reasonable, whereas they underestimate the potential for interference for the two bands centred on 183.31 GHz.</p>
<p><b>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?</b></p>	<p>Confidential? – N</p> <p>I would strongly urge to reconsider, and select bands which are not critical to the success of mature operational services of importance to life and economic well being in the UK.</p> <p>If for reasons that are not apparent this is considered impossible then realistic worse case assumptions need to be made, because at present assumptions have been made which will significantly underestimate the potential impact of the proposed changes on the existing services using these bands. If it is considered that these frequencies are the only option the reasons need to be given more clearly, because there is no need to stimulate more use of these frequencies, they already have a major and important application. It is other frequency bands that are under used.</p>
<p><b>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?</b></p>	<p>Confidential? – N</p> <p>Same comment as above.</p>